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The
Honey-Makers

By

Margaret Warner Morley

Author of "A Song of Life," "Life and Love,"
"The Bee People"

Illustrated by the Author



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1899

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Part I

The Honey-Makers

I

STRUCTURE, HABITS, AND PRODUCTS OF THE HONEY-BEE

LITERATURE is filled with the Honey-makers and their incomparable gift, which appears now as ambrosia, now as nectar, and always as the synonym of sweetness unsurpassed.

The Vedic poets sang of honey and the dawn at the same moment, and all the succeeding generations of India have chanted honey and its maker into their mythologies, their religions, and their loves.

The philosophers of Greece esteemed the bee, and without honey and the bee the poets of Hellas would have lacked expressions of sweetness that all succeeding ages have seized upon as consummate.

The Latin writers studied the bee not only for its usefulness as a honey-maker, but because of its unique character for industry, for its skill as a builder, and for its wonderful sagacity in its social organization.

The writers of the middle ages were not only familiar with what had been said in the classics, but themselves knew the bee, its virtues, and its uses in literature.

Modern writers are principally concerned with the structure and habits of the bee as revealed by modern science,

and particularly with the part played by it as a fertilizer of the fruits and flowers.

To fertilize the flowers has always been the office of the bee, as we can see now that the processes of nature are understood. But it cannot so easily be believed that the bee once gave the world the only "sugar" it had, — that is, the only material for sweetening; yet it is but a few centuries since sugar came into use in Europe.

The first cane-sugar known in our records came from China, that wonderful secret country which has given us so many of our useful arts.

Its course was thence to India and Arabia, and between China and these countries it appears to have been for centuries an article of trade.

Alexander the Great, in that remarkable expedition which did so much to make the West acquainted with the East, is probably responsible for the first knowledge Europe had of sugar, for it is said that his admiral, Nearchus, on the return of his army to Greece B. C. 324, brought with him as a rare and delectable delicacy a quantity of sugar candy.

The method of making "candy" appears to have been known and extensively practised in China from a very remote antiquity, and it was sent in large quantities to India.

Thus we find candy, so frequently condemned as vain and frivolous, a most venerable and historical commodity, the forerunner of the tremendous sugar industry in the western world at the present time.

Nearchus's candy was not the varied and delectable confection compounded by the artists of the present day, but probably a very simple sweet.

Theophrastus, 320 B. C., calls sugar a sort of honey extracted from canes or reeds; and Dioscorides in the second

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century informs us that a sort of concrete honey, called sugar, is found upon canes which grow in India and Arabia Felix.

This sugar, we are told, was in consistence like salt, being, like it, brittle between the teeth.

"Sugar" came to be a synonym for everything that had a sweet taste, hence the acetate of lead is called "sugar of lead."

It was not until about the seventeenth century that sugar became an article of common use in Europe. Up to that time it was used chiefly as a medicine, or by the rich as a delicacy at feasts upon very special occasions.

At the present time sugar has superseded honey as an article of every-day use. Honey has lost most of its importance in the family life; but not so the bee, for we now know that it does inestimable service in perfecting the fruits of the earth, and that without it our orchards would be lean and our gardens barren.

This knowledge makes a scientific study of the bee as fascinating as is the story of honey and its maker in relation to the individual life of the races of men that have preceded us.

Since the bee existed before literature and history, the true sequence in treating it is, first, its structure and habits, and then its place in song and homily.

Its structure and habits were partly known and partly guessed by the ancients, who from Hesiod down wrote about it. Aristotle gives the best summary of Greek knowledge upon the subject, and from him succeeding authors down to near the present time drew their materials, amplifying the fables and absurdities, until the earliest English books upon the bee, although written in perfect seriousness, in the light of what we know to-day, read like humorous compositions.

The bee lends itself so readily to fun that at the present time it is treated as a joke almost as frequently as a sober subject for scientific research. In the present book the natural history of the bee is treated and the latest scientific results on the subject are given, yet, feeling that the general reader will enjoy the quaint and curious opinions of earlier generations, even as the present writer did, they too are set before him, not to discredit the gravity of so serious a subject, but rather as it were to warm the cold facts of science with a human glow and make them smile a little. Hence Aristotle and Pliny, Moffett and Butler, appear with their testimony concerning the structure of wings, tongue, or sting, alongside the modern scientists, instead of being kept strictly to their own side of the fence in the part entitled the Literature and History of the Bee.

In the second part of the book the bee is set up to be looked at in the light of mythology, the legend, poetry, history, and literature; and an astonishing insect it has proved to be under this examination. The writers of Indian literature have used it constantly, as have also the Greek and Latin writers from the earliest times to the later ones. Plato in philosophy and Plutarch in history have set it in their pages.

In mediæval times the church drew some of its most useful illustrations and lessons from the habits of the bee, and everywhere its wax has been used in magic and necromancy as well as in religious observances.

The northern nations owe it a debt so great that we can scarcely see how they could have fought and sung without it; certainly they could not have mingled the draught that created the saga or brewed the mead that pledged the hero, without the cloying honey.

The poetry of the present is so rich in its use of the bee that it has been necessary to pass it almost without pausing,

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so impossible is it to do justice to this subject in a book of reasonable length.

It has not been the object of the author to exhaust the subject of the bee in literature, — that would be a task, indeed, — but rather to show the important place it holds in the principal literatures of the world, and to share with others the pleasure derived from pursuing the bee through these extensive and very delightful pastures.

It may not be out of place to say a word here concerning the bee's place in nature. It belongs to the branch of the animal kingdom known as Arthropoda, which contains more species than all the other branches taken together, and whose members are characterized by having the body composed of a series of more or less similar rings or segments joined together, some of the segments bearing jointed legs. To the Arthropoda belong the spiders, scorpions, centipedes, lobsters, and insects.

The insects again form the largest division of this branch, and they are distinguished as being air-breathing, with distinct head, thorax, and abdomen, possessing one pair of antennæ, three pairs of legs, and usually one or two pairs of wings in the adult state.

The insects form about four-fifths of the whole animal kingdom, and about a quarter of a million species have been described and named! And this enormous number is only a fraction, some say not more than one-tenth, of those actually existing.

Insects, according to certain peculiarities in structure, have been divided into several Orders, one of which contains butterflies, another beetles, another flies, etc.; the Order to which the bees belong being the Hymenoptera, or membrane-winged insects, though they do not alone deserve the name, as members of other orders have also membranous wings.

The Hymenoptera form a large Order, tens of thousands of species having been described and named, and these are a comparatively small part of those still unknown.

The members of the Hymenoptera are characterized by having four membranous wings, furnished with comparatively few or no transverse veins. The hind wings are smaller than the fore wings. The mouth parts are formed for biting and sucking. The abdomen in the females is usually furnished with a sting, piercer, or saw. The metamorphosis is complete.

The Hymenoptera may be divided into two parts, — those with instruments for boring, and those with stings.

The saw-flies, gall-flies, and a host of insects that lay their eggs in the bodies or eggs of other insects belong to the boring Hymenoptera, while to those bearing stings, known as the Aculeata, belong our well-known bees, ants, and wasps.

These do not employ their piercing instruments for boring, but for quite another purpose. They are stinging insects, having a poison-bag connected with the sting. The poison was probably used originally in obtaining food for the young, as it still is among the wasps. Wasps do not kill the insects they sting, but paralyze them and keep them alive and fresh as food for their larvæ. This was probably the office of the bee's sting originally; but if this was so, time has so modified the insect that the sting is now no longer used to provision the nest, but has been turned to account in defending it.

Some bees have no stings at all, but such as have use them in defence only.

The family of bees is a large one, and is naturally divided into two parts, — the short-tongued bees and the long-tongued ones, or the Apidæ. Among the Apidæ, or honey-gathering bees, there are a number of genera, chief among which is the genus *Apis*, to which our honey-bee belongs.

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So we see the honey-bees of this country have a great many near relatives ; indeed, counting the short-tongued bees that do not lay up honey but feed their young on balls of pollen or pollen and honey mixed together, there are thousands of species.

Even among the honey-making bees there are several genera and many species scattered over the world. The bumble-bee alone, which has a long tongue, though it does not always store up honey, has over fifty species in this country.

But our chief concern is with those bees that have been induced to lay up stores of honey in hives by which man has profited, and which in all but tropical countries belong to the genus *Apis*, of which again there is a number of species.

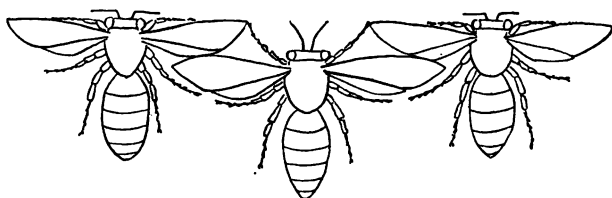
The Hymenoptera as an Order stand high in the scale of life, and of them the bees take first rank, — the hive-bee being by some placed next to man in point of intelligence. Certainly they stand at the very top of the insect scale.

The innumerable "bees" flying about the flowers in summer are not all hive-bees. Many of them are the wild short-tongued bees searching for pollen, and these are soon recognized by their small size and slender forms.

The bumble-bees, on the other hand, which belong to the genus *Bombus*, are larger than the hive-bees, though some of the smaller workers occasionally approximate the hive-bee in size, but bees of this genus can always be recognized by their black and yellow hairy coats. Bumble-bees are covered with hairs that form a thick short fur of alternating black and yellow stripes or areas over their whole bodies excepting sometimes a round bald spot on top of the thorax. Hive-bees have few or no hairs on the upper rings of the abdomen, and present a very different appearance from their furry relatives.

Many people do not know the hive-bees from the small worker bumble-bees; but the furry coat of the latter will always identify them.

With this slight introduction we will proceed to a more careful consideration of the organs and activities of our subject.



II

THE BEE'S TONGUE

BOTH ends of the honey-bee have always been of singular interest to us, and this for exactly opposite reasons. It is the "tongue" that supplies the combs with honey, and the sting that never fails to admonish us when we become obtrusive in the affairs of the hive.

Pater Abraham a Santa Clara feelingly describes the bee as "honey before, a lance behind," and this has been expressed in later times by one who epigrammatically denominates the bee "a double-end; one end the friend, the other end the enemy, of man."

To the humorist the sting is the chief end of the bee. So it is to the popular apprehension. It is the first thing a boy learns about a bee, and the only one he cares for, unless it comes to be a question of mingled fear and hope in robbing the store of the worker.

But we must not accept the opinion of either the humorist or the boy, for the tongue is mightier than the sting, just as in modern life the pen is mightier than the sword.

"Through the soft air the busy nations fly,
Cling to the bud, and with inserted tube
Suck its pure essence, its ethereal soul,"

sings Thomson in his "Spring," recognizing that mysterious organ, the bee's tongue, which next to the sting has from all time engaged man's interest.

A bee's tongue is very wonderful, and is not at all what it appears to be.

Offer a captive bee a fresh white clover-head, and of a sudden, apparently from nowhere, there appears a long brown tongue that at once finds its way into the clover nectaries, appearing and disappearing in the most astonishing manner as the bee crawls over the head of flowers.

One watching this rapid tongue and trying to make out whence it comes and whither it goes is reminded of the peaman's game of "Now you see it, and now you don't."

The truth is, it is not easily observable excepting when in use. At other times, it is kept discreetly folded back beneath the head, where it fits into the space between the head and thorax, and offers a satisfactory explanation for

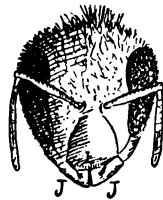


the peculiar manner in which these two divisions of the body are attached to each other. The head is

fastened near its upper edge to the thorax by its slender "neck," and were it otherwise, were the attachment more generous in size or lower down, when the bee folded back the sharp-pointed "tongue" it would be in danger of cutting its own throat, which would be inconvenient, to say the least!

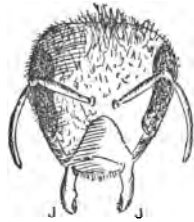
When a bee is about to produce its tongue it first opens its jaws, which are where one would expect to find jaws, at the lower margin of the face.

When the bee is at rest, one looking it full in the face would get no hint of a tongue, seeing only these tightly closed jaws (*J, J*) and above them the upper lip (*L*), the lower edge of which is bordered with a row of short, stiff hairs, which are sensitive and act as feelers.



Disturb the bee a little and open fly the jaws, not to accommodate the tongue this time, but evidently to strike terror to the heart of the intruder.

Bumble-bees are more apt to threaten with their jaws, which are large and powerful, than are honey-bees, the latter being quicker to sting. No doubt a bumble-bee can bestow a very creditable nip with these horny organs, as it will often demonstrate by biting viciously at a pencil-point when disturbed by it. It evidently knows there is no use in wasting good sting power on a pencil-point, so it expresses its feelings with its jaws.

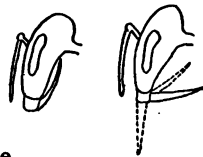


Any bees caught in a net will bite at the meshes, and this is a very good way to watch the play of the jaws, which, as in other insects, work sideways instead of up and down, like those of the higher animals.

The jaws of the bee are somewhat sickle-shaped, are more or less toothed according to the species of bee, are hard and horny in substance, are fastened at either side of the face by a hinge-joint, and meet or overlap in front when not in use.

In this chapter, for the sake of clearness, the complex organ commonly known as the tongue will be called the proboscis.

One approaches it with a fear which even the sting does not inspire, for probably few other organs of its size, in all the world and in all time, have been so much written about and so good-naturedly quarrelled over as has this same little bee's proboscis.



We will consider, at present, only the proboscis of the worker honey-bee.

When one first looks for it in a resting bee, it is found folded back under the head and out of the way. When needed, it is let down by a sort of hinge-joint,

The Honey-Makers

and brought forward between the jaws, which, as we have seen, open for that purpose. It now has the appearance of a short, stout, sharp-pointed dagger (*S*) with two little feelers (*X, X*) at the tip.

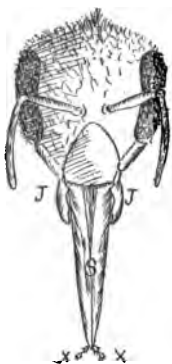
Instantly there appears, reaching below the point of this dagger, a very active, tiny, thread-like tongue (*T*) wriggling about in the honey or nectar and licking it up very much as a dog's tongue licks out a dish.

The best way to watch the action of the proboscis is to place a hungry bee near a drop of honey. As long as the honey is abundant and easily reached, the proboscis will probably remain as described; but if the bee wishes to reach a more distant point, the proboscis is suddenly lengthened, an inner portion (*S, S*) is shot out, reminding one of the manner of lengthening of a telescope. This inner part is seen to bear the feelers (*X, X*), as they are carried with it.

The tongue itself is thrust further out of its hiding-place.

In short, with great rapidity the proboscis can be extended until the tongue is able to reach more than half the length of the bee's body.

As this interesting exhibition is watched, one discovers that the proboscis is not a closed tube or tubes, but is composed of parts which separate more or less as the bee imbibes the honey.



The Bee's Tongue

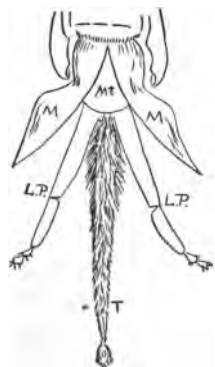
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In fact, the bee's proboscis is not a tube at all, though it can perform the office of one at need. A closed tube would be an inadequate and clumsy possession to a bee, as it could not lick up nectar so quickly and could not free its proboscis without great loss of time in case that instrument became clogged.

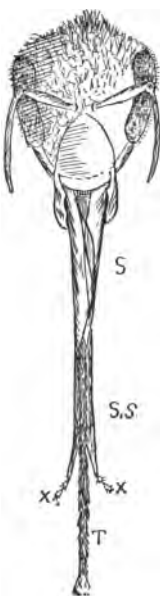
Any one who has watched a bumble-bee disengage a bit of honey-comb or other foreign substance that had become wedged in its proboscis will appreciate the advantages of an organ that can, so to speak, be taken quickly apart and cleared out.

The proboscis lies behind the upper lip and is formed of the tongue, the lower lip, and two side pieces called maxillæ. These organs are common to all insects, but in the bees are modified to form a long nectar-gathering instrument.

The two maxillæ (*M, M*) together form the sharp-pointed dagger-like organ which the bee first lets down. They are horny in substance and are two-jointed. They can readily be separated from each other as shown in the illustration, though normally they lie side by side, the thin inner edges of their lower joints (2,2) overlapping *above* the tongue and forming the top of the proboscis.



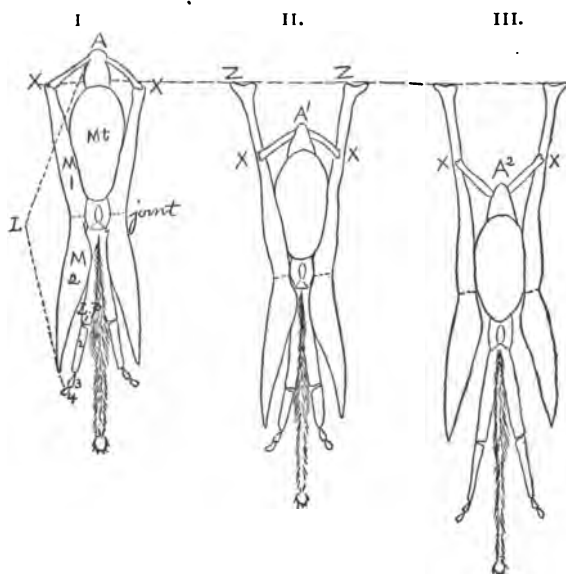
They are hollowed within, thus forming an arched roof to the proboscis, but as they do not meet underneath, they fail to form a perfect tube.



Beneath the maxillæ lies the lower lip. This is composed in part of two four-jointed organs, the labial palpi (*LP*). Like the maxillæ the palpi have two large horny joints (1, 2), but they also have two short joints (3, 4), which possess sensitive hairs, and, in short, are "feelers."

The two palpi lie side by side, their inner edges overlapping *underneath* the tongue, so that, like the maxillæ, they form a partial tube.

Thus, where the proboscis is let down but not lengthened it is a short tube, closed above by the maxillæ, below by



the palpi. When by a remarkable contrivance the labial palpi are extended beyond the maxillæ, the proboscis is lengthened but is no longer a complete tube, since, deprived of the roof formed by the maxillæ, it is open above.

This, however, does not interfere with the collecting of nectar, as the tongue, or ligula (T'), is covered with rows of hairs which make it easy for the liquid sweets to be conveyed up to the complete tube above.

In order to examine the wonderful mechanism by which the proboscis is lengthened and shortened at will, we will now look at the under side of the proboscis with all the parts widely separated.

We have here the maxillæ (M, M), or outer sheath, as before, with both joints (1, 2) plainly distinguishable.

Between them we have the lower lip (L) with the upper cylindrical part or mentum (Mt) and below that the two labial palpi (LP, LP), these palpi forming the inner sheath.

Between the palpi is the tongue (T) having its roots in the mentum and capable of being withdrawn partly into that portion, by the action of muscles joining tongue and mentum.

The maxillæ are attached to a plate under the bee's head at the points Z, Z , of Figs. II. and III.

In Fig. I. these points are below and behind X, X , and are concealed by the overlying parts.

The proboscis in Fig. I. is not lowered, but is as short as it can be.

In Fig. II. the bee has lowered its proboscis by opening the hinges at Z, Z , which thus lowers the point A of Fig. I. to A^1 of Fig. II., leaving the points of attachment, Z, Z , exposed to view.

In this way the *whole proboscis* has been lowered, the inner and outer sheaths retaining their original relative position to each other.

Now the bee desires to extend its tongue still farther, and to this end lowers the proboscis yet more, in order to do this making use of other hinges similar to those already used at Z, Z .

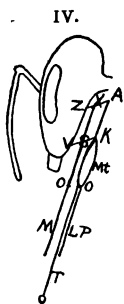
These hinges are at X, X , the point A^1 of Fig. II. being joined to X, X , by the stiff, horny arms A^1, X , on either side.

Certain muscles which are attached to the head as well as to the proboscis by contraction depress the arms, as seen at A^2, X , in Fig. III., and lower the point A^1 to A^2 , opening the hinges at X, X , and thus lowering the inner sheath. This now projects below the outer, and the proboscis has been extended to its maximum length below the jaws. The final act is to lengthen the tongue to its utmost by withdrawing it as far as possible from the mentum Mt .

Thus, by means of springs or hinges or levers, as one may choose to think of them, the proboscis can be quickly lengthened and shortened.

A profile view of the tongue and its motor mechanism is interesting and makes the manner of lengthening the organ clearer.

The proboscis is slightly lowered, otherwise A would be applied closely to the line of the head, the whole apparatus would be tightly closed, and its mechanism concealed.



Corresponding to the arm ZA on either side is a lower parallel arm VK , which is visible only in the profile. This arm, like that at ZA , is tough and horny, though very slender, and it is evident that the parallelogram $ZAKV$, being jointed at each angle, can, by swinging on these joints, depress or elevate the side AK and with it the attached inner sheath and tongue.

But this parallelogram is divided in two at points X, S , and is also movable at these points, and the parallelogram $ZXSV$ can change its relative position without changing that of the parallelogram $XAKS$ as seen in Fig. V.

Thus, the whole proboscis is lowered the distance from

X to X^1 , the outer and inner sheaths retaining their relative positions to each other.

But the parallelogram X^1AKS is capable of a similar change of relative position, as Fig. VI. shows, thus lowering the inner sheath and with it the tongue below the point of the outer sheath, and extending the proboscis to its greatest length beyond the jaws.

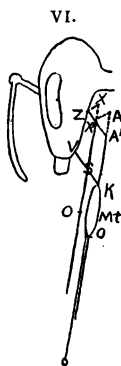
This really simple and very effective apparatus is worked by an arrangement of muscles reaching from it to the head, and as simple and ingenious as the framework itself, when the work they accomplish is considered.

When not in use the proboscis is doubled back at the joints marked on Figs. I., II., and III., and at O, O , on IV., V., VI., and VII.

The tongue of the bee is a hairy organ, a

fortunate circumstance when the very imperfect tube of its proboscis is considered. The hairs are arranged in rings around the tongue, the longest ones being towards the centre, and no doubt act as efficient aids in lifting the nectar through the proboscis to the mouth when there is an abundance of nectar within easy reach.

The tongue in such cases licks up the nectar, and one can readily watch a bee gorge itself on a drop of honey, the parts of the proboscis quite widely separated, the active tongue licking in and out, and a band of honey, so to speak, extending from the drop almost to the mouth opening. The greedy little creature is fairly shovelling in the unaccustomed abundance.



The Honey-Makers

An exposed drop of honey, however, is an unusual piece of good fortune for the bee ; generally, it has to insert the proboscis into tubular flowers, where the nectar cannot be licked out in this easy way, and if the bee were unable to profit by the more inaccessible nectar of the flowers, starvation would stare it in the face. But the bee has a tongue of resources. When nectar is abundant it can gather it speedily and carelessly, but when distant or scarce sweets are to be reached, it is also equal to the occasion.

There is a groove running lengthwise at the back of the tongue, which is somewhat complicated in structure and which is closed into a tube by means of hairs which are so placed that they cross each other, forming a covering to the groove, but which can easily be moved aside when it is desirable to open or clear the tube.

The end of the tongue is a cylindrical disk covered with delicate hairs, which aids in licking and also in starting the nectar into the central groove.

This groove or tube is no doubt used to convey small quantities of nectar to the mouth, so by means of its complicated tongue the bee can gather nectar of any amount or any degree of accessibility.

The root of the tongue, as we know, is in the mentum, and when not extended for use it is withdrawn into the mentum in a manner which the accompanying illustration makes clear.

It is very easy to see the manner in which the nectar *starts* on its upward course, but concerning its final method of entering the bee's body there is still room for a difference of opinion, — one maintaining that the upper part of the proboscis enlarges and contracts successively, thus pumping the nectar into the mouth ; another, that the honey stomach,



or sac in the abdomen that receives the nectar, is a "sucking stomach" and thus draws the nectar through the tubes. However, this may be, we know for a certainty that the honey does reach the honey-sac.

In the act of taking honey, the mouth-opening at the upper front part of the proboscis is firmly closed by a flap or lip of delicate membrane that appears below the edge of the upper lip when needed.

The bee is very quick to discover honey and when confined in a room will soon find its way to the honey provided for it. Where there are flowers it will soon discover them and proceed to rifle them of their nectar.

It is amusing to watch a bee on a cluster of flowers new to it. Its "unerring instinct" does not lead it at once to the best manner of securing the nectar; like the rest of us, it has to live and learn by experiment and gain knowledge through failure.

There is one flower concerning which a honey-bee never seems ignorant, however.

Present the captive with white clover-heads, and it instantly goes to work, putting the proboscis, or tongue, as we shall now call it, since we are done with scientific terms for the present, into flower after flower, always in the right place.

But with other flowers it is less certain.

Having been given a bunch of flat-topped flowers, whose nectary was in the form of a cushion-like disk easily reached, a honey-bee not long since made a most amusing and for a time unsuccessful effort to stay her hunger from this fragrant and all too evident nectar. Like certain unfortunate sentimentalists of the human race, she was trying to get the thing right before her face by aiming at the moon.

She was a thoroughbred bee, no doubt, accustomed to maintain her rank and find her sustenance in the aristocratic

tubular flowers, and to be requested to take nourishment from a flat-topped flower with no tubes, but holding nectar galore free to the common herd of short-tongued bees, flies, and other plebeian insects, was too much for her philosophy.

She could not credit it, and the little brown tongue was repeatedly thrust *between* the petals of this flower into the outer air, where it vainly waved and wriggled.

She evidently scented the honey, was hunger-distracted, and made frantic efforts to get it — by licking the air !

She persisted in trying to find tubular nectaries in mid-air for so long a time that her captor seriously meditated coming to her assistance, when finally her wayward tongue in its gyrations accidentally slid over the actual nectary.

The problem was at once solved. She licked the cushion-like nectary dry, went to another flower, and started aright.

In fact, she licked out every flower in the bunch without making another mistake, proving that though she acquired a new idea with difficulty, she kept it when she got it.

Honey-bees presented with different forms of papilionaceous flowers always had to find out by experiment where to find the opening to the nectary and how to get to it. Though when they had finally succeeded with one flower, they profited by their experience and quickly and dexterously rifled all of like form within reach.

Perhaps the most amusing of all were the bumble-bees trying to extract honey from the Iris.

This flower is so formed that the bee cannot get the nectar without creeping under the petal-like style (*X*), that lies curved against the true petal (*Y*) and acts as a spring when an insect pushes under it. Beneath this spring at *A* lies the anther ; and the flower's intention evidently is to make the bee pay for its feast of nectar by dusting its back with pollen as it crowds under the style, and carrying the

pollen to another plant. When the bee approaches the nectary of an iris flower its hairy back first comes in contact with the stigmatic surface (*S*) at the outer rim of the style; and if it has recently come from another iris, it will be pollen-dusted and will leave some of the pollen on the stigma. As it passes under the style its back will gather a fresh supply of pollen to be in like manner conveyed to another plant.

The captive bumble-bee, suddenly presented with a generous supply of iris flowers, evidently had had no experience with them, or if so, it had forgotten. It had been fasting for some time and speedily made its way to the new offering. It landed on a hanging petal—as it ought; but instead of creeping under the style as it ought and thrusting its tongue into the longed-for nectar while it incidentally dusted its back for the benefit of the House of Iris, it clumsily climbed over the top of the style and began to lick the centre of the flower, evidently with little satisfaction, for it moved constantly about as though searching for something.

Finally, it discovered the location of the nectar, though not the entrance to it, and made repeated attempts to reach it *from above*, clinging to the petal and putting in its tongue along the side of the style.

Its tongue was stretched to its limit, the bee stood on its tiptoes, so to speak, and the sympathetic observer could



feel if not see the anxiety depicted on its countenance. But all was of no avail. It could not get the nectar that

way ; it must conform to the law of the flower, or go hungry.



It tried again and again walking over and about the right opening ; but the flower, strong and stiff, met its stupidity by an equal obstinacy, until finally Madame Bombus solved the vexing riddle, forced her corpulent person beneath the stigmatic spring, stretched her neck and extracted nectar to her heart's content.

Emerging from the entrance to the emptied nectary, she unhesitatingly, and no doubt with a beam of triumph in her eye, forged across the flower and into another nectary entrance. From that time forward she lost no precious moments when iris blossoms were in question.

This raised in the observer's mind the query as to whether the need of becoming acquainted with the method of ransacking a flower for nectar might not account for the well-known habit of bees in collecting exclusively from one variety of flower during a given time. They find a flower which is abundant and whose nectar pleases them, they know just how to proceed, so it is a time-saving method to hasten from one flower to another like it.

Every observant bee-keeper has noticed the experimental manner in which bees search for nectar.

Their instinct as a rule leads them to seek the flowers for honey, though sometimes they do not seem even to know flowers without first investigating their little world and discovering them. Mr. Root says he has watched bees in the

springtime, very likely young ones, examining the "leaves, branches, and even rough wood of the trunk of the tree," as if smelling out the nectar. But when the secret has once been discovered, all who have watched bees know how well it has been remembered. Bees, like all living creatures, control their lives through the exercise of reason.

The bumble-bee, although belonging to another genus, is very similar to the honey-bee in structure, and while it differs in many ways in its habits, still its methods of gathering nectar and pollen are the same, and its large size and good nature make it a pleasant house companion.

It is longer lived when in captivity than the honey-bee, and not so likely to get lost when it has the freedom of the room. If one forgets to put it up for the night it crawls away into some self-chosen corner and emerges next day, making a great commotion.



The best way to discover how bees visit flowers is to give the bees a short fast, then introduce the flower to be experimented upon, with no other flowers in the room.

In this way the writer enjoyed a very amusing exhibition of the bumble-bee's performances with the moccasin flower or pink lady's slipper, — *cypripedium acaule*.

A whole afternoon spent in the dim woods with these strange and lovely growths failed to throw any light upon their method of fertilization.

It is reported that the small bumble-bees fertilize them, but at this season — June — there were no small, or worker, bombuses flying. They had not yet come out.

It was a New England June, one to remember, when a cool and rainy season had made the wild growths of the mountains of western Connecticut even more than usually luxuriant and beautiful.

Through the dim aisles of the hemlock and white birch trees that clothed a certain hillside the forms of the great pink orchids shone with almost unearthly effect.

The single blossom stood at the end of its long stem rising from two large leaves that looked as though they had scarcely yet been fully born from the earth beneath. They stood singly, but in small communities, little settlements of them, and occasionally two would be so close together that they looked like one plant.

It was no hardship to wander through these woods coming ever upon the magic areas where stood the orchids, giving one the feeling that they did not belong to this world, but were here for a time, brought forth by some powerful incantation.

The orchids were alone. The air was still but for the rustling of the hemlock boughs. Hours passed, and no winged messengers came to them.

By its nature the cypripedium is dependent upon winged insects. There is no plant more so.

It is an extremely advanced organization, so highly developed that it is difficult to see how flowers could go much farther along the road of progress.

There is one more step it could take, that of having stamens and pistil in different individuals. But it is as secure from self-fertilization as though this were the case.

The petal forming its large inflated sac is free along the upper edges, leaving a slit the length of the sac, but this slit is not evident without actually drawing apart the two sides of the sac, so closely do the overarching lips shut together and conceal it. The essential organs are borne on the

inner surface of the trap-door *A* at the top of the sac. The back of the round anther is visible in the illustration, but the stigma within cannot be seen. The space *X* forms an opening into the upper part of the sac.

One could not remain in that orchid-grown forest indefinitely, so there was nothing to do but to take a number of the mysterious and handsome blossoms home. They were still wonderful in the full daylight, and yet there is no denying they left a part of their charm in the mystery of the woods.

Their color is a beautiful pink, not like that of the rose and yet suggesting it. The full pink sac is adorned with bronze streamer-like sepals that heighten the color effect and increase the charm. There was a large queen bombus to welcome them to their new home, — a splendid creature that may well have held the rank in the insect world that they did in the world of plants.



She flew at once to the new flowers, and although her observer had no thought of her entering the orchid, or if so, of her being able to extricate her large body through the proper opening, she scattered theories to the winds by at once introducing her head through the slit in the front part of the sac and licking the inside of the flower as far as her long and flexible tongue could reach.

Then she forced herself in a little farther to reach yet unexplored sweets. Evidently orchid nectar was entirely to her mind, for presently she crowded still farther in, and in a moment more the lips of the sac closed triumphantly over her receding form and the first act in the romantic drama of the love of the orchid had been played.

By holding the flower against the light, the bee could easily be seen, as, all unconcerned as to how she was to escape, she greedily licked clean the inside of the ample sac.

When her appetite was satisfied, or more probably the sweets exhausted, she wished to come forth into the wide



Disappearance of the Queen.



Emergence of the Queen.

world again and tried to do so the way she went in, but orchid sacs that open to swallow up queen bombuses do not open to let them out again and her ingenuity was not sufficient to manage the combination that held her locked in prison.

Then, no doubt, casting her eye around she discovered the ray of light at the top of the flower and presently her black head appeared in the window, as one is tempted to call that interesting opening from the orchid prison.

The observer, having kindly decided not to let her die there, but to help her out after she had made a reasonable effort to extricate herself, sat and gazed at her black head with sympathy.

Just then she reached out a strong fore leg and firmly grasped the outside of the flower with her toes. Then she

reached out another leg. Then she slowly and thoughtfully emerged, whole and unharmed, with the stamp of the orchid on the top of her back in the form of a large round patch of sticky pollen which she had dragged from the anther under which she had squeezed herself.

Once out, she tried, unsuccessfully, to brush the pollen from her back, evidently feeling annoyed by it, and then buzzed her way straight to another of the orchids, insinuated herself into its sac, and when she got ready pulled her plump person successfully through the small opening at the top.

She bore the seal of the orchid all over the top and sides of her thorax before she was through her depredations on that handful of flowers, and of course in passing under the stigma on her way out must have left enough of her gathered pollen to fertilize the flowers.

Thus was forever dissipated the fear in at least one mind that the queen bombus is incapable of fertilizing the *cypripedium acaule*.

Some of the honey-bees that had the run of the window screen also went into the *cypripedium* flowers through the slit in the sac, but they came out at the top without touching the pollen masses, being too small to fill the necessary space.

As many of the flowers in the Connecticut woods set no seeds, it is probable that they are not greatly favored by insect visitors in this day and generation, or was this an off season for bumble-bees to favor *cypripediums*? However that may be, on that particular hillside, in that particular June, the *cypripediums* were slighted.

But such is the marvellous number of seeds developed in any one pod that does fulfil its destiny that a few mature pods would be sufficient to seed down the whole country side.

Although Queen Bombus was not observed to visit the cypripediums in the Connecticut woods, she was caught at it next spring in the Blue Ridge Mountains, where by the roadside was seen a splendid specimen of the cypripedium acaule, and from its narrow window a queen bombus triumphantly emerging.

One hears so much of the brightness of flowers as being the result of insect selection, and of the bees in particular as finding flowers by their colors, that one at first unconsciously looks to the showy blossoms when searching for bees. But this seems to be a mistake.

Early in the summer the huckleberries bloom, and over the rocks on the Connecticut hills may be seen clusters of straggling bushes loaded with small, rather inconspicuous red flowers.

These flowers are always alive with bees.

Great queen bombuses, airy honey-bees, and slender black bees of solitary habits are all there busily draining these toothsome blooms, while the vivid houstonia, whitening the earth like a fall of snow, seems to be quite ignored, and the buttercups, daisies, and many another showy bloom has only an occasional bee-visitor.

A little later the wild raspberry-bushes — or brambles — blossom with such an excess of delightful nectar that they have been able almost to dispense with petals. Their narrow white petals soon fall, and at the best are very inconspicuous.

The bees adore these modest blooms, and to come at them will pass the brilliant white blackberry blossoms, or the most gorgeous garden flowers, without a moment's hesitation. Bees could always be found on the brambles when they were to be seen nowhere else.

The mountain laurel, which held high carnival over the pastures and through the woods of Connecticut, piling up

crisp masses of bloom in a marvellous manner, did not win the favor of the bees, fortunately for those of us who love honey and do not care to be poisoned. For the honey of the laurel is said not to be good for man.

The honey-bees ignored it entirely, and only an occasional bumble-bee or fly was to be seen paying homage to its opulence — always excepting the yellow papilio butterfly with black bands on its wings.

These brilliant creatures fluttered by the score about the laurels, helping them hold jubilee, and adding their winged beauty to the grace of the floral outburst.

Perhaps in a season when other nectar was scarce, the bees would have turned to the laurel as a last resource, though honey-bees in captivity preferred starvation to laurel nectar.

Bumble-bees were less fastidious, and did not disdain to gather honey from every one of a large bunch of laurel flowers placed near their window.

Wild roses, however seductive in color and fragrance, do not attract bees as do many other less showy flowers; perhaps the bees remember, from ancestral experience, that the roses have no honey, only pollen to offer their guests.

All know how fond bees are of linden or lime tree blossoms, the trees when in bloom sounding like a vast bee-hive from the countless honey-gatherers busy in their midst, though the greenish flowers are so inconspicuous that many a one would fail to discover that the tree was in bloom were it not advertised so loudly by its loving friends.

From remotest ages the lime has been noted as a tree beloved by bees, and Virgil does not fail to tell us that the limes of his old Corycian bee-master were the first to bloom.

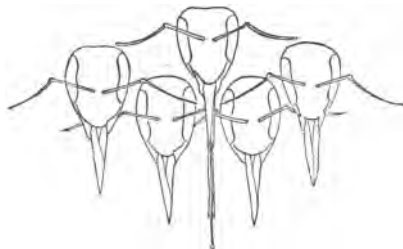
A little time spent in watching the bees in summer is a good tonic for the mind, and also a valuable corrective.

From learning of bees and flowers through much reading, one is apt to draw the lines too closely about the methods of nature. One thinks of flowers and bees as adapted by nature to each other, and as fitting together like the two parts of a machine.

While it is true that flowers no doubt are modified to suit certain insects and to attract them from afar, and the insects are modified to gather sweets from the flowers, still there are very few flowers that allow of but one insect visitor, and very few insects that visit but one species of flower. And any one who has watched a bee experiment with a flower new to it will be filled with a saving sense of the volition of insects, and of the manifold possibilities of action in the insect world.

There is variety enough in the life of a single bee to afford entertainment to the most exacting, and to show the futility of drawing rigid conclusions concerning the habits and senses of bees without an almost infinite amount of knowledge concerning the habits of all the bees in all parts of the world.

Bees certainly possess individuality, and to foretell the actions of any one from what is known of the habits of its race would be as sensible as to predict the actions of your neighbor from what you believe yourself to know of the habits of the *genus homo*.



III

EYES, ANTENNÆ, AND BRAIN

SOMETIMES bees fly several miles in search of flowers. Upon leaving the hive, they ascend high in the air as if to get their bearings, then they are off, zigzagging as fast as they can to the objects of their desire, for they do not fly in a straight line but continually curve from side to side. There is little doubt that the eye directs these distant flights, and that the bee sees the shine of the flower fields much farther away than man could distinguish them.

Certainly the bee is abundantly supplied with visual organs. On either side of the head are the two large compound eyes, each, in the worker, being composed of more than six thousand simple eyes or facets.

There has been a good deal of speculation as to how this astonishing supply of eyes can be used without breeding confusion in the mind of their possessor. It used to be affirmed that each facet gave a separate image of that portion of the landscape directly in front of it, and that the union of these fragments made an unbroken whole; but to-day the balance of opinion is in favor of an unbroken image for each separate facet, and the final reconciliation of the ensuing chaos is believed to be accomplished by the blending of all the images into one, as our own two eyes give the impression of but one image.

Whether the bee's two compound eyes focus together, as do our two eyes, is another matter, and probably they do not, as in the honey-gatherers the eyes are well over

on the side of the head, and probably each one gives an image independently of the other. In Butler's "Feminin Monarchi," written in 1609, and reprinted in 1634, occurs a description of the bee's eyes too funny to omit; and modern science will look askance at it, though the ordinary reader, unscientific but observant, after looking a bee in the face, will at least sympathize with Butler's dilemma. For how could a man in 1634 expect to find a creature's eyes covering both sides of its head? Says Butler, —

"Her two cheeks being transparent like lanthorn, do serve, though immovable, instead of eyes; through which the *species* of things visible are conveyed to the common sense."

When examined by the microscope, the eye of the bee is found to be constructed on a plan somewhat resembling that of our own eyes, there being lenses, rods, and nerve-ends. The outer lens found in each facet of the bee's eye is biconvex, and this is fortified by another lens just back of it, which is long and cone-shaped.

The rods and nerve-endings back of these lenses are complex and difficult to understand, and it is enough to know that the facets of the compound eyes are very telescopic in action, enabling the bee by means of them to see far better at a distance than near at hand.

Its chief need of eyes is to discover flowers, and consequently its compound eyes are probably little more than highly trained blossom detectives. It appears to have but one idea when it goes abroad, and that is to find a nectar-flowing flower as soon as possible.

With its eyes to discover distant masses of color, and its antennæ to scent the nectar as it approaches, it is very well qualified to accomplish its wishes. But these great compound eyes after all are not much better than a pair of telescopes pointing about in search of clover heads, and,

Eyes, Antennæ, and Brain 41

when it comes to a near-at-hand object, the bee, as far as they are concerned, is very likely as blind as if it had no eyes. So these twelve or thirteen thousand facets have to be re-enforced by more eyes ; and near the top of the head, between the compound eyes, are three other visual organs arranged in a triangle, each one large as compared with a facet, though small as compared with the compound eyes themselves.

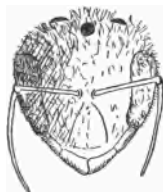
These three simple eyes are overhung by tufts of hairs like very shaggy eyebrows, and when one of them is discovered with a magnifying glass, it shines out like a bright bird's eye, the light often focusing upon it in a way to make it simulate the eye of higher animals.

These three eyes are not on the same plane, and it is difficult to see all of them at the same time, because of the hair that covers the top of the bee's head. This hair can easily be shaved off, however, as has been done in the illustration.

The central eye is lower than the two others, and is somewhat to the front of the face ; it is directed up and out, so that while the two compound eyes are busy searching space for flowers on either side, this forward-looking eye perhaps prevents the eager worker from bumping its reckless head against obstacles close in front.

The two other eyes are over the edge, as it were, resting in slanting depressions on top of the head, and being directed upward and to the right and left respectively.

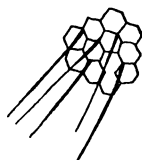
The structure of the simple eyes, or ocelli, is somewhat similar to that of the facets, but is simpler, and the lenses are shaped for near vision. Though in some cases they do not seem to perform their part with remarkable success, they doubtless have their value.



A bee does little credit to these three eyes when stumbling about in search of something almost within reach. If its hive is moved only a few feet during its absence, or if it misses the alighting board and drops to the ground, it often wastes a great deal of time bustling about in what seems a very aimless manner before it finds itself again.

Between the hexagonal facets of the compound eyes, and slanting in the direction towards which the eye curves, so as not to obstruct vision, are hairs.

Why the bee should have hairs on its eyes may not be apparent until one remembers the unprotected state of those lidless organs. And also the fact that the eyes are constantly in danger of becoming dusted over by various substances as the bee dives its head into flower-cups, explores the waxen cells of its hive, and flies abroad on windy days.



Section of bee's eye.

It would not do for these eyes to be injured or obscured in any way, and the hairs that cover them are protective, and from their structure no doubt also sensory, so they form the body-guard of the eyes, keeping them from all harm.

Eyelids would be a great inconvenience to a bee ; eye-hairs serve every purpose and offer no inconvenience whatever.

As to what a bee sees with its eyes, and how the objects familiar to us appear to the owner of these numerous optical organs, one is not in a position to state.

It is well known that bees distinguish colors, and Sir John Lubbock goes so far as to assure us that honey-bees prefer blue, he having discovered this by alternately alluring and deceiving them with slips of colored paper upon which were — or were not — drops of honey. He found his bees investigating the blue slips before trying other colors, and following the blue about when it was moved from place to

place, even when the honey had been transferred to some less attractive color.

Bee-keepers sometimes paint their hives different colors to enable the occupants to find their way home in a crowded apiary.

While bees undoubtedly distinguish colors, and may have their preferences, it is, as we have already seen, assuming too much to say that color is the chief factor in attracting them.

Certainly white clover heads blossoming in a meadow of overtopping grass are not conspicuous from their color, and yet here you will always find the bees. Here they will come from distant hives, if nearer clover pastures do not stay them.

How do they know? Do they scent the clover from afar? or do they recognize the color environment of white clover heads, the green smooth meadows, the low-growing vegetation?

And when the fragrant load is gathered, what directs their homeward course? Do they recognize the particular house, barn, or clump of trees that overlooks their hive? Some sense they have that tells them its exact location, for, mounting high in the air, they turn in the right direction and make a "bee-line" for home.

Apparently their eyes deceive them at times and lead them to seek honey from the white expanse of glaciers and snow-clad mountain tops where travellers frequently speak of having seen them dead in large numbers.

The bee's antennæ are as necessary as its eyes in the search for honey, and more necessary in other walks of life.

"And he shall sing how, once upon a time, the great chest prisoned the living goat-herd, by his lord's infatuate and evil will, and how the Blunt-faced-Bees, as they came

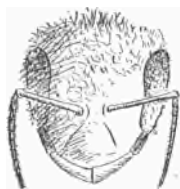
up from the meadow to the fragrant cedar chest, fed him with food of tender flowers, because the Muse still dropped sweet nectar on his lips."

Thus sang Lycidas concerning the shepherd Comatas, who in his zeal to serve the Muses sacrificed to them his master's goats, and was therefore put in a cedar chest and shut up, but, as the song relates, kept alive for the space of a year, and until his release, by the ministrations of the Blunt-faced-Bees.

Wise indeed have these insects been accounted from all time, and wonderful is the organization which enables them to accomplish their manifold and clever tasks.

Whether they fed Comatas in his cedar chest some may question; but this cannot be questioned, that if they did feed him, they found him there not by the sense of sight or by means of any organ such as we possess, but because they were endowed with the most mysterious and remarkable of organs, the antennæ or feelers.

Between the eyes of the "Blunt-faced-Bees" reach out the feelers, and these several-jointed organs, as has been intimated, are matters of importance. With them the bee hears. With them it smells, and by means of them it converses. Deprived of them, it becomes a stricken thing, helpless, deaf, dumb, and despairing.



Huber experimented by cutting off the antennæ. The removal of one antenna produced no observable effect. Not so the removal of both, for then the bee became little more than an idiot or lunatic and, unable to perform the necessary duties of the hive, soon perished.

The queen-bee, when deprived of her antennæ entirely lost her maternal instinct, moved aimlessly about, avoided

the bees, dropped her eggs anywhere, and did not resent the presence of another queen. The workers did not seem to recognize her ; and when finally she left the hive, they did not follow her, and she returned no more. Drones and workers behaved in a similar manner, stood idly near the door of the hive, apparently attracted by the light, and at length went away, doubtless soon to die.

Without its antennæ, the bee must soon starve, being unable to find the fragrant nectar that is its food, or even to take honey that is close at hand. Huber's queen-bees after losing their antennæ thrust their tongues all about the head of the worker that was trying to feed them without being able to find its open mouth.

Watch the captive bees when honey is given them. It is the feelers that investigate the delicacy proffered under such suspicious circumstances, and it is the feelers that, moving this way and that, direct the more distant bees to the feast.

It is the feelers that first lightly investigate the blossom upon which the bee is placed, and direct it to the nectary, or cause it to flee quickly from some distasteful bloom.

The feelers can be moved easily in any direction, as they are attached to the head by a convenient ball-and-socket-like arrangement. Their first joint is long and acts as an arm to turn in every direction the remainder of the organ, which is composed in the case of the worker bee of eleven short movable joints. So the outer portion of each antenna is flexible, and can be curved or moved within limits.

The eight lower joints are covered by extremely delicate sensory hairs that give to the antennæ their peculiar sensitiveness as organs of touch, even, it is believed, enabling them to serve the purpose of extra eyes in performing the labors of the dark hive.

There are other coarser hairs, more abundant near the

extremities of the antennæ, which are supposed to be highly specialized feeling-organs.

On the lower, outer part of the last six or seven joints, and more abundant towards the end of the antennæ, are microscopic circular depressions which are believed to be organs of hearing, ear-openings, so to speak.



Besides the special organs already noticed, there are what Cheshire calls the "smell hollows."

These are oval in form, larger and far more numerous than the ear-holes, and are found between the touch hairs on the front of the last eight joints of the antennæ.

There is the amazing number of 2400 of these oval depressions on each antenna, which well accounts for the very acute sense of smell which bees undoubtedly possess.

These little antennæ are only about $\frac{1}{8}$ of an inch long, and their lower specialized portion is only $\frac{1}{8}$ of an inch long in the worker bee, and $\frac{1}{10}$ of an inch in diameter, yet this lower part is possessed of thousands of highly specialized sense-organs.

That bees hear has been a matter of faith from the time of Aristotle, and, after having been denied in very scientific and learned terms in recent times, is now again an accepted belief. They *do* hear. Or at least they possess a sense equivalent to what in us is hearing.

They do not notice all sounds, but then, neither does any one else, and Sir John Lubbock's tuning-forks, whistles, and violins that failed to elicit any response from his bees may, as Cheshire has so well pointed out, be due to the fact that bees are not interested in the sounds of these instruments. Cheshire says, —

"Should some alien being watch humanity during a

thunder-storm, he might quite similarly decide that thunder was to us inaudible. Clap might follow clap without securing any external sign of recognition; yet let a little child with tiny voice but shriek for help, and all would at once be awakened to activity. So with the bee: sounds appealing to its instincts meet with immediate response, while others evoke no wasted emotion."

From another pen we read the following, —

"Every apiarist has noticed the effect of various sounds made by the bees upon their comrades of the hive; and how contagious is the sharp note of anger, and the pleasant tone of a new swarm as they commence to enter their new home."

Moffett, in his "Theatre of Insects," not only allows to bees the faculty of hearing, but credits them as well with musical appreciation, —

"Neither are they altogether impatient of musical sounds, as other ruder forms of creatures are, but are very much taken and delighted therewith; provided it be without variety, simple, and unaffected."

It may be that Sir John's efforts were beyond their understanding, and that what he mistook for indifference was, in reality, a condition of stupefied surprise induced by his too complex tuning-fork and violin vibrations.

But Moffett continues, —

"They are likewise very fearful of an echo, thunder and lightning, and the like sudden crackling noise; as on the contrary with a soft still whistling, or murmuring noise, and tinkling of brass they are exceedingly taken and delighted."

Nay, he proceeds farther, and would have us believe the bees possessed of a sensitive organization that not only hears but responds actively to music, as witness the following, —

"And although they cannot dance by measure or according to the just number of paces, as the elephant is said to do, yet according as he that tinks on the brazen kettle pleaseth, so they slack or quicken their flying; if he beat fast and shrill, then they mend their motion, if dully and slowly, then they abate it."

One would much like to see these bees of olden time dancing to the piping—or rather "tinking"—of their masters.

The words of their seventeenth-century historian may not prove to the satisfaction of the exacting modern scientists that bees possess the sense of hearing, but they certainly do prove that the people of olden time believed they did.

Butler has surpassed every one in his faith in the musical power of bees. He has actually written a musical score which he calls the *Melissomelos*, or "Bee's Madrigal," the swarming song which the bees sing just before leaving the hive. It is well known that the queen utters a peculiar note at that time, and that the sound of the swarm preparing to issue is characteristic; and Butler discovered, to his own satisfaction at least, that the queen and the departing "prince" sing to each other a well-defined song, of which the queen takes the bass, the young "prince" the treble. After explaining the different notes and chords used by bees, he adds, —

"So that if music were lost, it might be found with the muses' birds."

The antennæ are not only ears, but are nostrils to their possessors, a fact proved for the first time, as far as we know, by Huber.

"Not only do bees have a very acute sense of smell," says he, "but they add to this faculty the remembrance of sensations. Here is an example: We had placed some

honey on a window. Bees soon crowded upon it. Then the honey was taken away and the outside shutters were closed and remained so the whole winter. When, in spring, the shutters were opened again, the bees came back, although there was no honey on the window. No doubt, they remembered that they got honey there before. So an interval of several months was not sufficient to efface the impression they received."

Bees have often smelled their way down stove-pipes and through key-holes to a coveted feast of honey, and Langstroth's bees got into his honey-house by coming down the chimney and through an opening made by the motion of a loose fire-place screen.

It seems that this screen moved back and forth in windy weather just enough to allow one bee to pass at a time. Down the chimney came the bees and waited their turn for a chance to crawl through when the opening appeared. When one succeeded she is said to have expressed her delight by a joyful humming that led to her discovery. Having appropriated a load of honey the little trespasser waited until the honey-house door was opened, and then flew home.

There is another interesting story, told by Mr. Root, of bees visiting a honey-house and imparting to their hive-mates the joyful tidings that the door was open.

The bees, discovered in the midst of their eager labor, were expelled, and towards night all was again in order in the apiary with not a bee near the honey-house door. Then the bee-keeper, desiring to try a new "feeder," placed it in front of one of the hives where the bees were clustered on the outside. It was soon discovered by some of them that filled their honey-sacs from it and went joyfully into the hive to unload. Those inside took the hint and at once out poured the inhabitants of that hive, bent

on sharing the booty. But not to the feeder did they betake themselves. They rushed past that without noticing it, and went straight to the honey-house door! Of course they thought it had been left open again, and when they found it closed, they returned to the hive.

Fond as bees are of nectar they are yet fonder of honey, and will leave the fields at any time to collect a load of ready-prepared sweets. Thus bee-keepers often have trouble in handling the honey in their apiaries, for when the bees get scent of the alluring harvest they fall upon it and perform prodigious feats in conveying it quickly back to the hives. Indeed, under the intoxicating influence of ready-made honey they often become demoralized, and like a miser at the sight of gold, dream only of acquiring the largest possible amount. Thus swarms sometimes fight over the honey, and finally the strong ones break into the hives of the weak ones and rob their own neighbors.

Bee-keepers understand that when honey is to be handled it must be taken into a room and the door closed, or else there is danger that the whole apiary may be seized with a frenzy for robbing, and a general scrimmage ensue.

When this happens the by-stander will do well to keep out of the way, for when the fight is on every living thing is regarded as a foe.

Perhaps the most convincing proof that bees find honey by the aid of scent alone is afforded by Huber's experiment of placing honey in closed boxes with an opening covered by a hanging valve which the bees had to push aside in order to enter. This they did, entering the dark box, securing a load of honey, and finding their way out again.

All this is in great contrast to the results achieved by Sir John Lubbock, when experimenting to find whether bees returned to honey, and whether they brought or sent their

companions. He first, as he writes, "placed some honey in a glass, close to an open window in my sitting-room, and watched it for sixty hours of sunshine, during which no bees came to it.

"I then, at 10 A.M. on a beautiful morning in June, went to my hives, and took a bee which was just starting out, brought it in my hand up to my room (distance of somewhat less than 200 yards), and gave it some honey, which it sucked with evident enjoyment. After a few minutes it flew quietly away, but did not return; nor did any other bee make its appearance."

The following morning the same experiment was repeated with the same result, and on several other occasions. On the whole Sir John Lubbock's bees seem to have been particularly stupid, and after citing a number of experiments he concludes, —

"I might give other similar cases, but these are, I think, sufficient to show that bees do not bring their friends to share any treasure they have discovered so invariably as might be assumed from the statements of previous observers."

No doubt bees, like people, differ, and very likely the members of a large and flourishing apiary may have their wits sharpened by much competition — like people in a crowded community.

The ancients believed in the olfactory power of bees, and Aristotle says, —

"Insects can smell from a great distance. Bees scent honey, for they perceive it from long distances, as if they discovered it by scent."

And Pliny says, in speaking of bees when swarming, —

"If one of them falls in the rear from weariness or happens to go astray, it is able to follow the others by the aid of its acuteness of smell."

The antennæ, in some mysterious way, afford means of communication. By them the bee says all it feels to its friends and relatives.

Watch two bees meet on a window-frame : they instantly cross feelers, and if they come from the same hive there ensues such an outpouring of bee-talk, such a tremor of crossed antennæ, such an evident condition of excitement all through their bodies as might well fill the most practised gossip with envy.

One can imagine the graphic terms in which they relate the recent awful experience of their capture, how they were suddenly and rudely jerked from a sweet blossom, and after indescribable shaking about in a strange thing made of bands too close together for them to get through and too tough for them to bite through, finally found themselves, as they supposed, free.

The joy after the fear ! but alas, their happiness was of short duration ; for when they attempted to return to the clover field visible in the distance, they found themselves suddenly checked in mid-career by what seemed a wall of thickened air, a strange, hard, cold, transparent nightmare of a barrier which they could see through, but could not pass.

Poor little bees, no wonder their antennæ fly in the discussion of such queer facts, and how fortunate that the ears of the ogre, their captor, are not attuned to the remarks of their antennæ, as they express their opinion concerning him morally mentally, and physically !

Just what bees talk about is their secret — also just how they talk. Suffice it to know that they *do* talk, or at least have a method of communication which, it may be, more resembles the sign language of the human deaf mutes than the articulate speech of those able to hear.

Perhaps it is a series of touches or taps like those of the

telegraphic code, —but what is the use in speculating about it? Whatever the method, this we may be sure of, they know each other when they meet by crossing antennæ, and they know strangers in the same way, and are as eager to converse stingwise with a stranger bee as they are to gossip amicably with a friend.

When one advances a pencil or other small object towards a bee that apparently is sound asleep, long before the object is within what one would suppose to be noticeable distance, the antennæ fly out. They work nervously back and forth, as though inquiring the quality and meaning of the approaching object.

The bee examines objects at a distance by means of these remarkable organs, and those within reach by gently tapping or touching them with the tips of the antennæ, which, as we know, are best supplied with sensory organs.

When the bee is asleep, or resting undisturbed, the antennæ droop in a seemingly helpless manner; but at the slightest hint of disturbance, these reliable sentinels are elevated and on duty.

No doubt bees recognize their queen by touching her with the antennæ, as Huber performed a number of careful experiments to prove. He separated the queen from the bees by a wire partition, through which they could see, hear, and smell her, but could not touch her; and they soon betrayed all the symptoms of a queenless colony, and began to build cells in which to raise a new queen. But when the queen was so confined that they could touch her with their antennæ, they showed no inclination to build queen cells. They knew she was there, and they were comforted. Doubtless, too, the information that the queen is missing is conveyed from bee to bee by crossing the antennæ, as Huber also demonstrated.

With its antennæ alone, our bee would be better en-

dowed with sense power than seems to be the case with many a being having a merely human complement of eyes, ears, nose, and tongue.

One can but wonder if the bee's joy in living is acute in proportion to the amazing sensitiveness of these wonderful organs. We should very much like to know that.

Inside the head is the motor that runs the tongue, eyes, and antennæ, and gives the bee its consciousness of the outer world.

The small size of the bee's brain makes its power seem to us the more wonderful. From it emanates such wisdom that from all time the bee has been held as a model before mankind.

Concerning it Moffett says, voicing the beliefs that had come down through the ages,—

"Whereas the Almighty hath created all things for the use and service of Man, so especially among the rest hath he made Bees, not only that they should be unto us patterns and presidents of political and oeconomical vertues, but even Teachers and School masters instructing us in certain divine knowledge, and like extraordinary Prophets, premonstrating the success and event of things to come."

And again, —

"Xenophon likewise in his Oeconomicks, termeth Honey-making the Shop of vertues, and to it sendeth mothers of Housholds to be instructed. Poets gladly compare themselves with Bees, who following Nature only as a School-mistress, use Art."

Although the bee's brain is so small an object, it is complex, and can better be understood by a brief glance at the general nervous system.

In the larva, which is the undeveloped bee, there is very little differentiation of the nervous system.

The business of the larva is to eat and assimilate food

through all parts of the body. Hence the nervous system is very much alike from end to end, the ganglia being but little larger and more complex at the head end.

In the adult bee the conditions of life are very different. Instead of devoting its life to eating, it now devotes it to providing food for others, and in performing many complex actions requiring a high form of intellect.

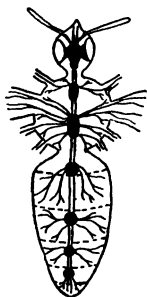
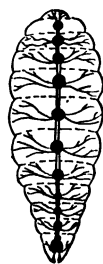
- Consequently in our adult bee we have the nervous system centred more toward the head, and culminating in a comparatively large and well-developed brain.

So far as the nervous material of bees is concerned, there is no great difference between them and ourselves. Their form demands a different location for nerve-trunks, but the nerves themselves, like those of the higher animals, are composed of bundles of sensory and motor fibres, and distributed along the course of some of the nerves are found ganglia. The brain is composed of gray and white matter, as in the higher animals, and is without doubt the organ of consciousness and intelligence.

Besides containing the brain, the bee's head holds also three sets of glands, the smaller one opening within the mandible on either side, while a larger set opens at the base of the tongue.

The secretion of these two sets of glands is probably saliva, and with it must mingle any nectar entering the bee's mouth, and thus probably is the nectar at once partly changed before it reaches the stomach.

The third set of glands within the head opens into the mouth, and is credited with very remarkable func-



tions, first secreting the silk of which the larva spins its cocoon, and later supplying a liquid food for the young bees.

Numerous muscles, as we know, also find a resting-place and points of attachment within the head.



IV

THE WINGS

IN the long-bodied, golden-hued Italian bee, the wings are not more than three-fourths the length of the abdomen.

Clinging to the flowers with these small and dainty gossamers vibrating above its form, the little creature seems like some tiny sprite bearing wings for beauty rather than for use.

Yet the airy wings of our pretty bee are most effectual instruments of flight, carrying her many miles in the course of a summer day.

Butler quaintly tells us that "Nature hath furnished her with four wings : which, swifter than the East-wind, carry her into all the four coasts of the world ; and thence with her precious lading bear her back again, until her incessant labor hath worn them out."

The thorax, that division of the body next back of the head, is specially devoted to the organs of progression, bearing as it does the wings and the legs. Isolate the thorax and its appendages, and we appear to have the principal part of the bee, certainly it is the most showy part.



The head possesses the organs of sense and the wonderful tongue ; the abdomen, which is the last division of the body, carries the complex and respected sting ; but the thorax controls the usefulness of all these, since it has attached to it the means of locomotion.

In dealing with the bee's power of movement, it is right that the wings have precedence of the legs, they being the more poetical, dainty, and as well uppermost in position of all the organs of progression.

The description of bees given by Moffett that "they have four wings, being of a bright and clear color, growing to their shoulder-blades, whereof the two hindermost are the lesser, because they might not hinder their flying," is not without its merits.

Certainly they have four wings of a bright and clear color.

One could scarcely better describe the appearance of the shining transparent gauzes that adorn the bee's back, and if they are not attached to the shoulder-blades, at least they are attached to what doubtless would be shoulder-blades if the bee had shoulders.

They are where the shoulder-blades of the human being are located, and to speak of them in this way immediately and accurately places them, in the imaginative and unprejudiced mind of the non-scientific observer.

It is true, too, that there are four of them, and that the hindermost are the lesser.

When flying, a bee appears to have but two wings, and practically this is true ; but when it comes to rest, these two accommodately resolve themselves into four, in order that the hindermost and lesser pair may be tucked away beneath the foremost and greater pair.

The smaller and lighter the wings, the less do they hamper the movements of the bee, yet they must be strong and firm ; and these wings have a stiff framework like that of a kite, and like that are also overlaid with a thin light membrane

against which the air can find resistance. The lines of the framework though quite complex are very constant, so that

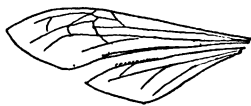


the species of a bee is determined by slight variations in them.

On either side of the thorax, at the point of the suppositional shoulder-blades, two wings are attached. The points of attachment of the two are very close together, but when the wing is extended, the lesser and hindermost is seen to be placed a little behind the larger and foremost.

While the double wing, when closed, is a great convenience in exploring flowers and moving about the crowded hive, it would be extremely disastrous when set for flight if the lesser and the greater were then to separate. But this they never do, as they are locked together in a very ingenious manner.

The upper edge of the lower wing bears a row of hooks, the points of which are turned towards the inside. On the lower edge of the upper wing, opposite these hooks, is a fold forming a slender groove into which the hooks catch when the wings are raised. The mere act of raising the wings draws the hooks into the groove and locks them.



The greater the pressure brought to bear against the surface of these locked wings, the more firmly are they held together, so they are in no danger of coming apart in the most rapid or erratic flight.

Quickly and safely as the wings are locked into one, they can as easily be separated into two, when lowered against the back in a state of rest.

The wings do not necessarily come unlocked when lowered, however, and one often sees a captive bee with its locked wings spread over its back, as though it knew that were safe enough under the circumstances, and would not take the trouble to pack them away. But when it enters a flower or its hive, a slight motion of the upper

wings separates them from the lower, when the latter slip away out of sight under the former.

Important as it is that the bee should have ample wing expanse when flying, it is equally important that it be not hampered by outreaching wings when about its work in flowers and in the hive, where large wings would not only be inconvenient, but would be liable to become torn and broken.

The speed with which the wings move is amazing, it having been calculated that during their swiftest motion they make over four hundred vibrations a second!

Powerful muscles are necessary to sustain the bee's flight, and its thorax is a mass of muscles, perhaps the most remarkable of any in the world.

Tiny threads they are, yet when one considers the work they do, the massive muscles that move the elephant or the ox are as nothing compared to them.

The rapidity with which the bee is borne through the air is not very well known, as it is not an easy point to determine. Cheshire says, —

“My own observations lead me to suppose that the pace ranges between two and sixteen or eighteen miles per hour, depending upon the load and the nature of the errand — a bee, bearing the body of the deceased sister from the hive, taking the funereal pace, while those issuing forth on business bent go express.”

If the bee moved its small wings with the deliberation of the butterfly, they could not hold it suspended for a moment. But it has an engine that the butterfly dreams not of. At the moment of flight its thoracic muscles start the wings to moving with a rapidity that makes one think of a pair of buzz saws, and away goes the bee, merrily speeding through the air, its cheery hum an involuntary song of triumph to its own wonderful structure.

With its marvellous engine run by vital force in operation, it can go where it listeth ; and while the more helpless butterfly is often blown about at the mercy of the wind, its gorgeous wings even serving as sails to catch the breeze and carry it far out to sea, the bee, like a trim little steam launch, heads up against the wind, and goes where it pleases.

The exact manner in which the wings are used as organs of progression, raising the bee from the earth, speeding it in any direction, with or against the wind, taking it high in the air, or dropping it with lightness and accuracy upon a selected flower, is still a problem for philosophers to puzzle over.

There is no doubt that the flight of the bee is aided, perhaps rendered possible, by a very wonderful system of air-sacs and air-tubes.

There are large air-sacs in the upper end of the abdomen, almost filling it when distended with air, and there are air-sacs at the bases of the wings. These air-sacs open to the surface by minute orifices called spiracles, one at the base of each of the four wings, and several others open on the sides of the abdominal walls.

The bee, like the bird, is supplied with air-cavities to sustain it in its flight, and these air-cavities are also its "lungs."

It pumps the air into them by a continuous motion of the abdomen when at rest, and has the power to close the spiracles, and thus shut in a large amount of air when it desires to fly.

Packard tells us that the insect can change its specific gravity by filling or emptying its air-sacs, and that increased exertion causes increased activity in breathing, while decreased exertion has of course the opposite effect, so that in hibernating insects respiration is almost entirely suspended. He also says that the air rushes into the thoracic

spiracles when the wings are raised, filling the air-sacs in the body, lessening the specific gravity of the insect and enabling it to rise in the air and remain there with but slight muscular exertion. At the first stroke of the wings the spiracles are closed and the air retained.

Girard says that inside each spiracle is a muscular valve that by opening or closing can let in or shut out the air, and that this is under the control of the insect, who can thus at will fill the air-sacs and decrease the specific gravity.

Thus we find the breathing apparatus of the bee complex in structure and varied in function. It serves to aërate the blood and at the same time to make effective the action of the wings.

Rapidity of respiration affects the temperature of the insect. The bumble-bee, according to Newport, raises its temperature by quickened respiration, and does this voluntarily in order to generate heat for purposes of incubation.

Doubtless the enclosed air, which is shut at the will of the bee into the air-sacs during flight, is heated by its body, thus becoming lighter, and acting as the gas in a balloon to increase the buoyancy.

The bee cannot fly until its air-sacs are filled; consequently when one which has been sleeping is suddenly roused, it cannot at once fly away, but makes a series of "hops," or little jumps, fanning its wings rapidly the while until the air-sacs are expanded with air and its body is in a condition for flight.

The pitch of the bee's wing music depends upon the rapidity with which the wings vibrate, and it was this pitch from the wings of an excited bee that gave foundation to the declaration that the wings sometimes move at the rate of more than four hundred times a second. As a rule, however, they move considerably slower than this, the maximum rate of vibrations soon inducing exhaustion.

By listening to the tone of the bee's wings, one can soon learn the state of its mind, for the low hum of happy industry is very readily distinguishable from the high-keyed note of fear or anger.

When in the fields, one can soon learn to know the species of a bee by its hum, before the bee itself has been found by the eye. The low drowsy note of the bumble-bee can be recognized at once, and the sharp, short tone of the small wild bee is easily distinguishable from the pleasant, intermittent note of the honey-bee going from flower to flower, the most agreeable of all bee-voices.

A sharp listener can even tell whether the sound proceeds from the large or the small bumble-bee, and very likely one with gifted ears could tell, without seeing, just what species of the many wild bees that inhabit our land had crossed his path.

The voices of the bees are as significant to those who love and listen as are the voices of the birds to the bird-lovers. These voices are only in part dependent upon the wings, however, as it has been ascertained that there is an apparatus in the tubes or tracheæ leading from the spiracles to the air-sacs, which, in a way, simulates our own vocal chords; and that by forcing the air past these organs the bee can at will produce a humming sound.

When a bee has lost its wings, or when they have been stuck together so as to be immovable, it can still "speak its mind" in a very shrill outcry. It is probable that the "crying" of bumble-bees caught in a net is due to the action of these vocal organs. Whoever has caught bumble-bees has been amused and even touched at the many-toned outcry they make, as though they were indeed calling for help, or imploring the mercy of their captor. The sound is very distinct from the buzzing made by the wings as the bee flies from flower to flower.

There is yet another bee-voice, as the French naturalist Girard tells us. —

"The humming is not produced solely by the vibrating of the wings, as is generally admitted. Chabrier, Burmeister, Latreille have discovered in the humming three different sounds: the first, caused by the vibrating of the wings; the second, sharper, by the vibration of the rings of the abdomen; the third, the most intense and acute, produced by a true vocal mechanism placed at the orifices of the aerial tubes."

The ancients often came curiously near the truth in their observations, and Aristotle, speaking of the sounds made by insects, including bees, says: —

"Insects have neither voice nor speech, but make a sound with the air within them, not with that which is external."

He then speaks of the humming of bees with their wings, and of the singing of grasshoppers. —

"All these make a noise with the membrane which is towards the division of their body, in those which have a division."

With such power of making various noises it would indeed be strange if the bee were dumb, in fact, as to the sounds made by its own kind, and there is every reason to believe it does hear and understand them.

"When some of the bees go to attend the bees who are in pain or a hive on the lightning-rod," says a believer in the language of bees, "they emit a short sound, s-s-s, moving in the same time towards the hive. This is a warning to go, to go, to and examine the object of their task, returning, sustained by their wings near the suspected object, and emitting at the same time a distinct and prolonged sound. This is a sign of great suspicion. If the whole moves in concert, it shows hostile intent,

the song is changed into a piercing cry for help, in a voice whistling with anger. They dash forward violently and blindly, and try to sting.

"When they are quiet and satisfied, their voice is the humming of a grave tune, or, if they do not move their wings, an allegro murmur. If they are suddenly caught or compressed, the sound is one of distress. If a hive is jarred at a time when all the bees are quiet, the mass speedily raise a hum, which ceases as suddenly. In a queenless hive, the sound is doleful, lasts longer, and at times increases in force. When bees swarm, the tune is clear and gay, showing manifest happiness."

Langstroth adds, —

"The German pastor Stahala has published a very complete study on the language of bees, which has appeared in some of the bee-papers of Italy, France, and America. We do not consider it as altogether accurate; but there are some sounds described that all bee-keepers ought to study, especially the doleful wail of colonies which have lost their queen, and have no means of rearing another."

The voice of the bee humming about the flowers has always found favor with the poets, as in Virgil's "Bucolics," —

"Happy old man ! here, among well-known streams and sacred fountains, you will enjoy the cool shade. On this side, a hedge planted at the adjoining boundary, whose willow blossoms are ever fed on by Hyblæan bees, shall often court you by its gentle hummings to indulge repose. On the other side, the pruner beneath a lofty rock shall sing to the breezes : nor meanwhile shall either the hoarse wood-pigeons, thy delight, or the turtle from his lofty elm, cease to coo."

Our modern poets are still enamoured of the voice of the bee, and Rogers stops us thus, finger on lip, —

The Honey-Makers

"Hark! the bee winds her small, but mellow horn,
Blithe to salute the sunny smile of morn;"

and Hogg, in his "Pilgrims of the Sun," sings, —

"As they pass'd by,
The angels paused, and saints that lay reposed
In bowers of Paradise upraised their heads
To list the passing music, for it went
Swift as the wild bee's note, that on the wing
Booms like unbodied voice along the gale."

"Hark! along the humming air
Home the laden bees repair,"

says Milman in his "Martyr of Antioch," while the Bard of Avon, in "Troilus and Cressida," informs us, —

"Full merrily the humble-bee doth sing,
Till she hath lost her honey and her sting."

The bee's wings, although so tiny, are yet larger than actually necessary to the performance of very creditable flight, as is often shown by old bees with worn and ragged wings. They oftentimes continue their nectar-seeking excursions in a state of wings that is truly deplorable.

They keep going as long as the wings on both sides are equally worn, and are apparently unconscious that they are sadly in need of repairs, flying long distances and bringing home heavy loads. But if one wing gets torn much more than the other, the case is hopeless, and they can no longer maintain their balance.

When a bee flies, it appears to give itself up to that glorious occupation as though wings were all there is to life. The heavy body droops a little downward, and the legs drop to their length, reminding one of the long legs that trail behind a flying heron.

A "bee-line," popularly supposed to be the most direct

line to a given point, is in reality the most eccentric of courses; and it is the swift curving from side to side that makes the flight of the bee so difficult for the eye to follow. Not improbably, bee-eating birds and insects experience an equal difficulty in following the course of the swift-darting morsel, that is seldom captured while thus describing its "bee-line."

Nor does the bee dart in a straight line up into the air; but when about to take its bearings for distant flight, it ascends to the regions above in a spiral course.

Necessity has led the bee to put its wings to another use than that of flight. Following an instinct which may have developed as a result of communal life, it purifies the air of the hive by means of its wings, as Huber first demonstrated.

The bee is much more dependent upon fresh air than we are. It is soon suffocated by foul air, and will not allow a degree of impurity within its hive which would be quite unnoticed by our senses. It lives in close quarters with many thousands of its kind,—in the ordinary hive from twenty to fifty thousand,—with only a small opening at the bottom of the hive.

The conditions for ventilation seem to us, therefore, the worst that could be devised. But such as they are, they must be accepted; for an opening at the top permitting a draught of air would oftentimes chill and prove fatal to the developing young. The hive must be warm within, and is kept so by the palpitating bodies of the countless inhabitants.

But bees also breathe and exhale from their bodies poisonous vapors as we ourselves do. Unlike the air in our habitations, however, that within the hive is always as pure, or very nearly so, as the air out of doors.

This is accomplished by the bees themselves, who take turns standing near the entrance and fanning with their wings. The low hum of these living ventilating fans can be heard outside the hive, and particularly on warm close days when it is more difficult to supply the needs of the crowded tenement.

So powerful is the draught from the wings of a fanning bee that it can be distinctly felt as a light cool breeze against the cheek when a captive bee performs this office. A piece of tissue-paper two inches square has been raised entirely free from the gauze covering to the little box in which bee-keepers send queen-bees by mail, by the fanning of a single bee; and when a dozen or more bees have a fanning party in the box they produce quite a little hurricane.

Captive bees will sometimes fan for a long time, apparently for the pure pleasure of the exercise. They seem attacked by an ecstasy of fanning, and for the time are interested in nothing else. The writer of these chronicles has frequently held a pencil between the wings of a fanning bee, which stopped operations while it remained there, but the instant the pencil was removed the wings started again as if run by machinery.

When fanning, the abdomen is raised, the head lowered, and the bee clings fast with its feet, moving slightly from side to side, or turning partly around.

It sometimes presents the appearance of performing a solemn dance, though the solemnity of the occasion is considerably marred by the wings that move so rapidly they irresistibly suggest a short gauze ballet skirt.

The bee's method of ventilation, driving both pure and impure air through one opening at the bottom of the apartment, and their brilliant success in accomplishing their

purpose, suggests the idea that their method might possibly be used successfully by architects in ventilating public buildings, it having the advantage of economy and of gaining the desired object without producing the "draught" so greatly feared by modern man.



V

THE LEGS

ALTHOUGH less airy and poetical than the wings, the legs of the bee have an interest of their own. In fact, when properly understood, they do not fall far short of the wings in poetic value ; and if the ancients had known them as we do, the bee's legs, no doubt, would have been immortalized in song and made the subject of innumerable graceful allusions.

As it is, the poets have done scant justice to the legs of my lady the bee, though Milton in "Il Penseroso" thus alludes to her pollen-laden thigh,—

"Hide me from the garish eye,
While the bee with honeyed thigh,
That at her flowery work doth sing,
And the waters murmuring,
With such concert as they keep,
Entice the dewy-feather'd sleep."

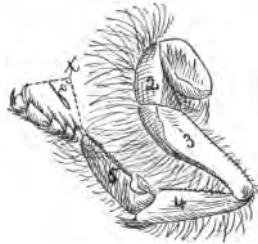
And Shakespeare in "Henry IV."— using the bees in a simile — speaks of "thighs packed with wax," a mistake as to the office of thighs, for they never carry wax, but a tribute to the thighs themselves that we cannot afford to let pass unnoticed.

The bee's legs perform the usual offices of legs : running, walking, jumping, climbing, and clinging, and do these things very well ; but this is the prose side, for they are furnished with ingenious and beautiful instruments for performing offices not usually accorded to mere legs. But

bees' legs are gifted organs, blessed with a versatility otherwise unknown in the realm of legs.

The bee has six of them, as is the habit among insects, three on either side of the thorax and attached to it.

Each leg consists of ten joints ; a small compact joint (1) next the body, called by naturalists the coxa. This is much alike in all the legs, and serves the useful purpose of attaching the remainder of the leg to the body by a highly movable joint.



Next comes another short joint (2), the trochanter, which serves chiefly to give to the leg freedom of motion.

The third joint (3), or femur, is long and rigid ; and these three joints are densely clothed with long-branched hairs that have an important office.

The fourth joint (4), or tibia, is long and more or less covered with hairs. It is remarkably modified in the different pairs of legs, and is as interesting as anything we have yet seen about this very interesting insect.

The fifth joint (5), or metatarsus, is also long and curious.

The remaining five joints are short and triangular, fitting together so as to give them great flexibility in moving. They are sometimes called the "foot," and the last joint of these consists of the "toes" or "hooks."

The legs gain much freedom of motion from the numerous joints, while the design of the different divisions allows them to be folded up close to the body when not needed.

As organs of walking and running, the legs are efficient enough for the purpose of the bee, who travels only short

distances by means of her legs, and who, unlike the spider, the daddy-long-legs, and other long-legged folk, has no necessity for leg speed.

The usual gait of the bee is a rather slow walk, and when she runs she usually evokes the aid of the wings, as the hen does when she attempts to run.

A bee does not jump much excepting when frightened or angry — then she goes along by little hops that make her ladyship appear rather ridiculous — as angry folk are wont to appear. If a captive bee is annoyed by a pencil placed in front of her to cause her to go in a certain direction, instead of travelling as desired, she will often jump at the pencil with open jaws, and give it a good biting for troubling her. She seems to know there is no use in stinging a senseless thing like a pencil, and does not make the slightest attempt to do so. Try to persuade her to change her course against her will with the end of your finger, however, and you will soon discover whether she knows the difference between that and a pencil.

The "foot" of the bee, being extremely flexible, enables its owner to gather flower-petals in her grasp, so to speak, and to curl her foot about the edge of a stalk or a cell of honey-comb. The final joint is particularly movable, and consists of two pairs of curved and pointed hooks, or "toes," a tuft of long, strong hairs between them, and a curious, soft, and flexible disk *X*, also lying between the pairs of hooks, and enabling the bee to climb upon smooth and upright surfaces.

This little white disk can be seen with the naked eye when the bee is ascending a window-pane, and like the foot of the fly it exudes a liquid that enables the owner to cling to the glass.

By a certain motion of the foot the disk is peeled up and the bee freed.

When walking on rough surfaces, the disk, or *pulvilla*, is folded together and turned back out of the way, the toes clinging to the irregularities.

The toes can be turned up so as to form veritable hooks from which the bee can suspend itself. The strength of these hooks is remarkable, they being able to maintain their position hours at a time, and bearing several thousand times the weight of the bee, as in the case of swarming, where the upper bees are hooked fast to the tree branch or other support, and the rest of the swarm suspended from them.



The six feet are all alike ; but while the legs share equally in the labors of walking, running, jumping, clinging, and climbing, each pair has its own individual duties, different from all the rest ; and to aid in the performance of these duties, each has its own special and peculiar implements with which to accomplish its designs.

The foremost pair of legs is the smallest and shortest, being attached to the thorax as close to the head as possible. These legs are indeed the servants of the head, keeping it and its important organs free from disturbing substances.

One prime function of the legs is to keep the bee clean.

A cat does not make as elaborate a toilet nor keep itself as neat as a bee, the cleanliness of the little creature having been noticed and commented upon from Aristotle down.

Butler says, — “ For cleanliness and neatness they may be a mirror to the finest dames.”

To watch a bee at its toilet is as edifying as it is amusing. One does not need to arrive at a certain hour nor wait at all for the performance to begin.

It is only necessary to catch your bee—and let it free on the window—and it will at once commence upon its elaborate and endless toilet. If it is sulky, or perchance considers itself clean enough for the present company, it can at once be brought to another mind by breathing upon it, when it will fall into a very justifiable rage and after venting its feelings in strong bee language will fall vehemently to work freeing every part of its diminutive person from the obnoxious exhalations. Or, dust it ever so lightly with a bit of fine flour.

No matter how dusty it is, or how badly stuck up from having been cruelly smeared with honey or syrup, it will cause itself to shine like a new bee in a few minutes, unless its spiracles have been smeared over and closed, when it will perish from suffocation.

First of all, its front legs will clean its precious antennæ.

Since the antennæ bear the principal sensory organs it is very important that they be kept perfectly clean at all times, and this is accomplished by an almost ceaseless applying of comb and brush to these wonderful organs.

It is the duty of the front legs to clean the antennæ and they are always ready—and nearly always doing it. In the midst of honey-gathering after every dip into a pollen-dusted flower the bee stops for a second to clean the dust from its feelers. This can be done very quickly, though a thorough cleaning takes more time, and a bee may often be seen apparently resting from its labor on a clover-head. But it is not resting—it is cleaning its antennæ. Whenever a bee appears to be resting in the midst of its work you may be pretty sure it is doing nothing of the sort but on the contrary is as busy as a bee can be

removing every pollen grain and particle of dust from its ear-holes, smell-hollows, and sensory hairs.

This it does by a very ingenious apparatus in the bend of the foreleg between the tibia and the metatarsus, — that is, between the fourth and fifth joints.

On the upper inner edge of the metatarsus is a semicircular groove just large enough to hold the antenna and surrounded on the outside edge by an outward pointing comb of very fine teeth.

Hanging from the lower inside edge of the tibia is a curious valve-like structure X, which, when the leg is flexed (Fig. 2) covers the opening to the semi-circular groove.



Fig. 1.

Seen from above this lid or valve somewhat resembles a slightly irregular curved fish scale with a keel running through the centre.



Fig. 2.

The antenna, when the leg is raised above it and then lowered, slips into the groove, the leg joint is then flexed, bringing the valve down so that the antenna is caught as in a trap. The leg being moved outward, the antenna is drawn through, the comb on one side



and the thin edge of the valve on the other scraping it clean.

This apparatus is evidently designed specially for cleaning the antenna and is a remarkable illustration of the development of an organ for a special purpose.

It is used very quickly and very frequently, and one watching a bee will surely see it draw its feelers through the cleaners.

The cleaning apparatus can be seen with the naked eye,

particularly on a large bumble-bee, and very beautifully seen through an ordinary magnifying lens.

Along the back of the joint containing the groove is a row of stiff strong hairs, as can be seen in the illustration, and these serve the purpose of an ordinary hair-brush, combing or brushing out the dust and pollen from the hairs on the bee's head, and particularly from the eye hairs.



Almost as often as the bee cleans its antennæ it brushes its head and eyes.

There is another important brush on the forelegs, opposite the hanging valve, used to sweep out the teeth of the groove on the opposite leg and to clean off the pollen from the long branched hairs that grow upon the four upper joints of the leg.

The stiff hairs on the short foot joints are also toilet brushes.

Instruments that do so much cleaning for other parts must themselves be kept clean, and this office the forelegs perform for each other. The bee may often be seen standing on its four hindermost legs apparently washing its hands with invisible soap in invisible water. Then it crosses its arms thus bringing the outside of one against the brush of stiff hairs on the outside of the other, and moves the two up and down until both are thoroughly cleaned.

The proboscis does not escape in the general cleaning up but is lowered, grasped by both forelegs at once, and vigorously polished.

It is amusing to watch a bee standing on its four remaining legs and holding fast to its tongue with both hands as it

were, though occasionally when needing its forefoot for support it will have but one with which to rub its tongue.

Butler treats us to the following : —

“Her rough and dew-clawed feet, apt to take hold at the first touch, are in number six : that she may stand fast upon four, while she useth the other two to wipe her eyes, her wings, her tongue, or any other part.”

Neither are the jaws neglected, but occasionally are opened and polished by their tidy owner.

The top of the bee's head, the thorax above and below and the upper joints of all the legs are clothed with long branched hairs for collecting pollen. These “gathering hairs” are admirably planned to catch and hold the pollen grains that touch them, and are found on all pollen-gathering bees. The pollen that adheres to the legs and body of the bee is a valuable part of its food, and is by it brushed together and saved.



The second pair of legs is larger and longer than the first pair. These legs have no antennæ cleaners, but at nearly the same place on the tibia is a long stout spur used in cleaning the wings and body as well as to push out the contents of the pollen baskets that are located on the third pair of legs. The metatarsus of this leg is covered with a coarse brush and the bee can often be seen with one of its middle legs over its back energetically rubbing the pollen from the branched hairs there and frequently

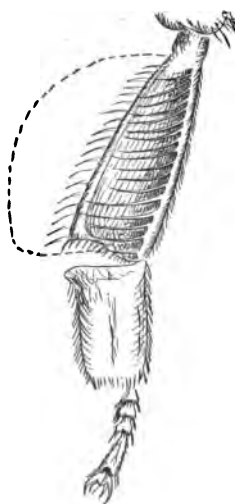


lowering the leg so employed to rub it between the back legs and relieve it of the accumulated load.

The bee is also frequently seen with one of its middle legs doubled under it, in the act of rubbing the pollen from the hairs of the breast.

The last or third pair of legs is perhaps the most curious and interesting of all.

Upon them are the baskets for storing and carrying home the pollen; these are borne by all the workers but not by the queen and drones.



Outside of third leg on right side. Dotted lines represent load of pollen.

The pollen-basket, or corbiculum, is the hollowed outer side of the tibia bordered by stiff hairs. The hairs along the edges curve in, thus forming the sides of the "basket" and preventing the contents from falling out. Every one has noticed the "honeyed thigh" of the bee, as laden with yellow, white, red, or brown pollen it scrambles over the flowers adding to the load.

In order to bring its branched hairs in contact with the pollen grains the bee rushes about over a bed of flowers as if looking for something it had lost, scampering back and forth and turning about in a dazed manner.

When on a single flower it gathers the pollen from the anthers with the legs, scraping them back and forth against each other to good purpose as the rapidly enlarging ball of pollen on the "thigh" proves. The pollen is made sufficiently adhesive by being occasionally moistened with honey.

Sometimes bees gather honey and pollen at the same

time, sometimes nothing but honey as the bare thighs testify, and sometimes nothing but pollen.

At the joint between the tibia and metatarsus, and best seen on the inside of the leg, is a curious modification known as the wax-jaws. This in reality is a pair of pincers by which the bee grasps and removes the scales of wax from the abdominal plates. The end of the tibia (*E*) is curved and fringed with stiff hairs that shut down against a plate (*P*) on the metatarsus, thus forming the "jaws."

The metatarsus on the inner side bears a beautiful shining golden-brown comb (*C*) of several rows of stiff bristle-like hairs. These comb pollen from the breast of the bee, comb down the wings, clean the middle pair of legs, clean the abdomen above and below and clean each other. With the exception of the antennæ cleaners they are the most often used of all the implements of the toilet.

The wing is cleaned by being caught between the body and these combs; the upper wing by itself, first one side and then the other, and the lower one in the same way.

These combs also make the final gathering of pollen and deliver the load to the basket of the opposite leg.

On all the legs cleaning hairs are mingled with the gathering hairs in order to keep the pollen-dusted little creature free.

Bees will clean each other of honey, though they do not take equal pains to restore to purity a sister distressed by other substances.

When disturbed slightly bees have a curious habit of raising the middle and last legs on one side of the body, as



Inside of third right leg.

if they meant to strike, or give warning to the intruder to stand back.

Bumble-bees are particularly given to this habit, and it is very amusing to see the warning legs fly up when one comes too close.

The legs are always used in this way when a stranger bee comes too near and the intruder thus repulsed generally takes the hint, unless it happens to be out of temper, when a fight ensues, a fight that always leaves the wounded in the throes of death.

It may be that these elevated legs are useful in catching hold of an enemy, for in this position the body can easily be jerked around and the fatal sting inserted.



VI

HONEY-SAC AND WAX-POCKETS

THE bees are chemists, transforming the thin crude nectar of the blossoms into honey, delicious to the taste and differing from nectar in several particulars.

When nectar is drawn up into the mouth of the bee it there mingles with a certain digestive fluid or saliva and in company with this pursues its course through the thread-like œsophagus to the honey-sac, which is located in the front blunt end of the abdomen.

This little sac has delicate, transparent walls and looks like a bubble when removed unbroken. It contains less than a drop of nectar, which shines through the body-wall when the bee is seen against the light, giving the little creature an airy appearance that is particularly marked in the golden-bodied Italian bee.

Butler thus describes the honey-sac : —

“The nectar or liquid honey, the bees gather with their tongues; whence they let it down into their bottles, which are within them, like unto bladders; each of them will hold but a drop at once.

“You may see their little bellies strut withal.”

Nectar contains cane sugar; honey, grape sugar, the change being effected by the saliva, or it may be partly by that and partly by digestive fluids in the honey-sac.

Nectar is neutral while honey has an acid reaction, the formic acid, present in honey, probably being secreted by

glands in the bee's head, and doubtless acting as a preservative against fermentation.

Honey is generally thin and watery when first taken to the hive, but as it is deposited in the cells less than a drop at a time much of the extra water evaporates, and further to facilitate evaporation the bees leave the cells uncapped for several days when nearly full. Sometimes the bees accelerate this "ripening" process by a vigorous fanning which may continue all night when honey is coming in fast.

The more thoroughly the honey is ripened the less liable it is to ferment, a fact in chemistry with which the bees seem to be acquainted.

The consistency of new honey depends somewhat upon the source from which it was gathered and also upon the haste with which it was stored.

The relative amount of cane and grape sugar seems also to depend upon the haste with which the honey was gathered and stored, the best honey containing but from one to three per cent of cane sugar, while poor honey, that probably gathered quickly from abundant nectar close to the hive and disgorged before the digestive juices have completed their work, may contain as much as sixteen per cent of cane sugar.

The walls of the honey-sac are surrounded by delicate muscles that by contraction are able to force the contents back to the mouth, whence it is conveyed to the cells of the honey-comb.

If a bee is teased after a full meal, or suddenly frightened, it will sometimes regurgitate the honey, which then may be seen hanging to the proboscis.

Since pollen must pass through the honey-sac into the true stomach beyond, the question arises as to how the bee is able to fill the combs with clear honey containing but the

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slightest trace of pollen. To answer this it is necessary to examine the honey-sac with a magnifying glass or a low-power microscope, when a curious organ, the "honey-mouth," is discovered.

This little "honey-mouth," placed at the back opening of the honey-sac, is firm and resisting in substance and looks not unlike a closed-up sea-anemone, or an unopened lilac bud. It is closed by four valves fringed by short, stiff hairs pointing out. It has been observed that by the muscular contraction of the walls of the honey-sac the



pollen grains which have been swallowed with the honey are collected together and finally passed through this "mouth," whose valves open to accommodate them.

Whatever extra honey escapes with the pollen through the mouth can readily be restored to the honey-sac by contraction of the muscles below the mouth, when the hairs prevent the pollen from also returning. In short, the "honey-mouth" is a cleverly devised strainer to free the honey in the sac from pollen grains.

Although nectar is changed by the bee it still retains a trace of its origin, and an expert honey taster can often tell by the flavor from what flowers the honey was gathered, as the flavor, color, and quality of honey depend to a great degree upon the blossoms whence it came.

Besides the aroma and flavor it retains from the flowers, however, all honey has a characteristic taste and odor; it is "like honey," no matter what its source. This honey odor is always discernible about the bee, the hive it inhabits, and the wax it secretes.

The nectar of flowers does not as a rule give forth the odor of honey. Indeed, nectar taken from the honey-sac

of a bee, even after having been there an hour or more, often has no odor or flavor of honey. This is true, not only of a bee kept in confinement and fed upon sugar syrup, but of bees gathering nectar in the fields. But after the honey has been stored in the hive redolent of bees it nearly always has the characteristic honey flavor and fragrance.

Everything about a bee smells of honey ; even the poison of the sting, though unpleasantly strong, suggests it.

Is not this the "race-odor" of the bee?

Every creature has its own peculiar race-odor, by which, as we know, it is often discovered by others of its kind.

Plants too have their race-odor by which we distinguish a lily from a rose.

Fortunately for us the honey-maker is an animated blossom that distils a delightful fragrance.

Of course a part of the honey gathered is consumed by the bee itself and this passes with the pollen into the true stomach where it is digested and then assimilated.

The waste is always ejected from the body of the workers outside the hive during flight.

This fact was noted by the ancients, and is another cause of the bee's reputation for purity and cleanliness. This is not the result of volition on the part of the bee, however, as the structure of the worker is such that in a state of health the excrementitious matter cannot be voided excepting in the act of flight.

Honey from all time has been esteemed for its curative properties, and is to-day valued for coughs and as Butler says, "cleareth the obstructions of the body."

Moffett recommends giving infants honey for "breeding teeth," and a modern writer says, —

"Honey promotes the excretions and dissolves the glutinous and starchy impedimenta of the body."

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Honey was in ancient times believed to have the power of procuring clearness of vision, which may be one reason for its reputation in giving the power of divination, the clearness of the physical vision being referred to the mental power of seeing.

“The honey pure and neat wherein the Bees are dead, let that drop into the eyes; or honey mixt with the ashes of the heads of Bees, makes the eyes very clear,” is Marcellus’ opinion according to Moffett. Galen recommends mingling one part of the gall of the sea-tortoise with four parts of honey.

Galen also gives another prescription, —

“Take Bees dead in combs, and when they are through dry make them into powder, mingle them with the honey in which they died, and anoint the parts of the Head that are bald and thin haired, and you shall see them grow again.”

This prescription does not appear to be in general use at the present time !

Moffett would have us believe that their ashes “beaten with Oyl” are good to make the hair white.

Bees and honey are put to many other medicinal uses ; indeed in the opinion of Moffett “Honey wherein is found dead Bees, is a very wholesome medicine, serving for all diseases.”

The value of honey is not confined to its effect upon the human body, and at the present time it is used as well in manufacturing to stiffen certain cotton fabrics ; and in the arts it is used in forming adhesive compounds as well as for other purposes.

According to Bevan the Jews of Moldavia and the Okraïne prepare from honey a sort of sugar, which is solid and as white as snow, and which is sent to the distilleries at Dantzic. The honey is placed in a vessel which is a

bad conductor of heat, and exposed to frost, protected from sun and snow, for three weeks. As a result of this treatment the honey becomes clear and hard like sugar.

The French chemist M. Cadet of Vaux gives the following method of purifying honey as a substitute for sugar. Boil honey and water with charcoal. Strain, boil, and skim until it hardens when dropped in water.

Honey is used for preserving fruits and also for enveloping and thereby preserving grafts, birds' eggs, and valuable seeds which have to be transmitted from one climate to another, and it is said to keep them available for a considerable time.

Besides the honey-sac the abdomen of the bee contains the remarkable "wax-pocket."

Aristotle tells us "wax is made from flowers;" and Pliny says: "Bees form wax from the blossoms of all trees and plants, with the sole exception of the rumex (sorrel, or monk's rhubarb) and the echinopodes (a kind of broom)."

For long it was believed that the bees collected wax from flowers and brought it home on their thighs like pollen.

Even Butler says: —

"The matter thereof [to make cells] they gather from flowers with their fangs; which being kept soft in their mouths, with the heat of their little bodies, of the air, and of their hives, is wrought into combs."

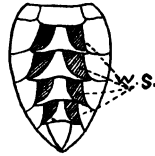
Later it was believed that pollen was changed into wax in the stomach of the bee.

It is now known that wax is a product of honey, which is eaten by the bee, altered into a fluid secretion by glands beneath the abdominal walls, and exuded as wax.

The abdomen of the bee is formed of rings held together by a flexible membrane so that they can overlap each other or be drawn apart somewhat like a telescope.

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The worker-bee has six abdominal rings, each composed of several pieces, one being on the under side and forming a broad curved plate. The part of each plate on the second, third, fourth and fifth rings overlapped by the preceding ring is smooth and light colored, and a little sunken so that it forms a shallow well; and when overlapped by the edge of the plate above is the so-called wax-pocket. The tissue inside the bee, beneath these depressions, is glandular in structure and secretes a liquid which exudes through the plate to the outer surface, where it hardens into a thin transparent scale of wax. These tiny scales are sometimes pushed down by exudations of the wax fluid above, and during the period of most active secretion may often be seen extending partly over the plate below. As the wax forms it is taken as needed from the pockets by the wax-jaws on the last pair of legs and conveyed to the mouth, where it is moulded and mixed with saliva to a consistency and form suitable to comb building. Bee-keepers have often tried to find a substitute for wax, but their artificial products have never been successful, the paraffine and other materials used lacking the necessary consistency and power to resist heat and breaking down in the hive, even when the bees can be induced to use them.



The bee consumes vast quantities of honey at certain seasons; but instead of growing fat thereon, it gives forth wax. Wax is a very costly product, the bees using from ten to sixteen pounds of honey to produce one pound of it.

Honey and wax have been used as medicine from the earliest times, and wax was the foundation of plasters in past ages.

It was also used in many other ways, some of which Moffett explains : —

“ The rich, sick, or great men, desire their candles to be made of it, by reason of the sweet smell. Also the use of wax is not small in stopping the chinks in vessels, for tents in the camp to keep out rain, for bed-ticks that the feathers fly not out, to joyn pipes made of reeds, as Ovid sang concerning the shepherds of old.

“ And with the Reed well waxed they play’d and sang.

“ Also the most excellent Painters painted with wax, as *Pliny* reports, and they adorned ships with it. This kinde of painting, though it were not hurt by salt, nor by sun, nor by the winde, yet it was lost we know not how, when *Apelles*, *Protogenes*, and *Zeuxis* died. Also the Ancients were wont to smear over their writing-tables with wax before that paper was invented, as *Juvenal* describes it.”

Butler informs us that an oil of marvellous virtue in curing disease was distilled from wax.

Sealing-wax for letters and documents was also made of beeswax, which was of different colors in different countries, and Moffett informs us that the bees of America gathered black wax. Either the Americans at that time were very careless in preparing their wax, or else the “ American ” wax came from Mexico or South America, where the tropical bees build a very dark-colored comb.

Shakespeare alludes to the use of wax in sealing documents in “ Henry VI.” where the rebels under Jack Cade meet on Blackheath, and one says, “ The first thing we do, let’s kill all the lawyers.”

To which Cade replies, —

“ Nay, that I mean to do. Is not this a lamentable thing, that of the skin of an innocent lamb should be made parchment? that parchment being scribbled o’er, should undo a man? Some say the bee stings : but I say

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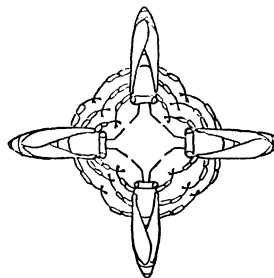
't is the bee's wax ; for I did but seal once to a thing, and I was never mine own man since."

Again in "King Lear," where Edgar, son of Gloucester, kills the steward and takes letters from his pocket, he says while breaking the seal, —

"Leave, gentle wax ; and, manners, blame us not :
To know our enemies' minds, we'd rip their hearts ;
Their papers, is more lawful."

In "Cymbeline" where Imogen receives a letter from her husband Leonatus she exclaims, —

"Good wax, thy leave : —bless'd be,
You bees, that make these locks of counsell ! Lovers
And men in dangerous bonds pray not alike :
Though forfeiters you cast in prison, yet
You clasp young Cupid's tables."



VII

THE STING

THE ancients were as familiar with the stings of bees from a practical point of view as we are, but they were more concerned in discovering a moral than a scientific reason for these inflictions, as were their successors, and even as late as the seventeenth century we find Moffett as puzzled over it as are a certain class of people to-day over the use of the mosquito to man, he and they believing that every living thing was created specially and wholly for the benefit of the *genus homo*.

After searching long for some good use in the sting of the bee Moffett was reduced to the following statement :

“The Ancients (that we may prove the sting of bees to be converted to some good use) were wont to punish cheaters with them on this manner: They stripped the malefactor stark naked, and besmeared his body all over with honey, which done, and his hands and feet being bound, they exposed him to the heat of the scorching sun, that what with the piercing raies beating upon his body, what with the stinging of the bees and flies, and their often stabbing and wounding him, he did at length suffer a death answerable to his life. But if you would indeed resolve to go sting-free, or at least heal yourself being stung; expel out of your minde, idleness, impiety, theft, malice; for those that are defil'd with those vices, they set upon to chuse as it were, and out of natural instinct.”

According to this pious sentiment a visit to a bee-hive would be a simple and final test of character, but one which few of us sceptical moderns would have fortitude enough to try, no matter how good of heart we might know ourselves to be.

We feel assured that bees discriminate, and while savage towards one are friendly towards another. But if theirs is a moral standard it is different from ours, for in these days they are as prone to attack the most inoffensive of the human race — according to our estimation — as they are to grant immunity to the greatest rascal. It is to be feared that manner of moving, texture of skin, or exhalations from the body influence modern bees more surely than goodness or badness of heart.

Other uses of bee stings are recorded, a knowledge of which no doubt would have filled the mind of our historian with satisfaction.

We learn from L'Abbé Della Rocca, who resided at one time in the islands of the Grecian Archipelago, that : "A small corsair, equipped with forty or fifty men, and having on board some bees, purposely taken from a neighboring island, and confined in earthen hives, was pursued by a Turkish galley. As the latter boarded her, the sailors threw the hives from the masts down into the galley. The earthen hives broke into fragments and the bees dispersed all over the boat. The Turks, who had looked on the small corsair with contempt, as an easy prey, did not expect so singular an attack. Finding themselves defenceless against the stings, they were so frightened, that the men of the corsair, who had provided themselves with masks and gloves, took possession of the galley, almost without resistance."

And again : —

"Amurat, Emperor of Turkey, having besieged Alba [in

Greece] and made a breach in the walls, found the breach defended by bees, whose hives had been brought on the ruins. The Janissaries, the bravest militia of the Ottoman Empire, refused to clear the obstacle."

Various strongholds in Germany are reported to have borrowed the weapon of the bee in time of need, and these mercenaries could always be depended upon to fight — and also to conquer.

Friedrich tells a story of a man who in time of war made his bees protect him from plunderers.

He had before his door six bee-hives, to each of which he fastened a string, taking the other end to his room. As soon as he saw soldiers approaching he pulled the strings until the hives were thoroughly shaken up, whereupon the angry bees fell upon the intruders in such numbers that they at once took to flight.

"Sesser tells us that in 1525, during the confusion occasioned by a time of war, a mob of peasants assembling in Hohnstein (in Thuringia) attempted to pillage the house of the minister of Elende; who having in vain employed all his eloquence to dissuade them from their design, ordered his domestics to fetch his bee-hives, and throw them in the middle of this furious mob. The effect was what might be expected; they were immediately put to flight, and happy if they escaped unstung."

"Olearius relates in the description of his celebrated Travels in Persia that his whole travelling escort was once driven out of a Russian village by a swarm of bees. The peasants themselves had excited the bees to this to be rid of their unwelcome guests, and they often used this device upon similar occasions."

"Pigneron relates that the Spaniards experienced the fury of the bees at the siege of Tanly. When they were preparing to make the assault, the besieged placed a num-

ber of hives in the breaches, which attacked the besiegers so furiously that they were obliged to retire."

Sometimes the bees fell upon people on their own account instead of taking part in human warfare, and Menzel tells us that whole cities were attacked by bees and the inhabitants driven forth and armies put to rout as is often related by the ancients, and that Bochart has gathered together these incidents in his *Hiero zoikon*, to which the curious reader is referred. Only it must not be overlooked, that the Cretan bees, living on Mt. Ida, and no doubt descendants of the sacred bees of Zeus, according to Antenor, long retained their fierce disposition and fell upon and stung every one who came that way.

"The bees which are called *Chalcoides*, which are of the color of brass, and somewhat long, which are said to live in the Island of *Crete*, are implacable, great fighters and quarrellers, excelling all others in their stings, and more cruel than any others, so that with their stings they have chased the Inhabitants out of their cities."

According to Kohl there is a rock on the Black Sea whose clefts are so well defended by their armed inhabitants that no one is able to approach, and Menzel quotes Herodotus as saying that the bees would allow no one to cross the Danube at a certain point.

There are also tales of a district in California where exceeding fierce bees have taken possession of certain caverns and allow no one to approach within a considerable distance.

During his travels in Africa Mungo Park in May, 1805, came near being wholly undone by the bees which the people of his guide Isaaco had infuriated.

Park says :—

"On the 26th, when the party had come up to a place called Bee Creek, a curious accident befell them. Some of

The Honey-Makers

Isaaco's people, being in search of honey, disturbed a large swarm of bees, which attacked the men and beasts of the company with such violence as to send them flying in every direction for safety. The severity of this assault may be conceived from the fact, that six asses and one horse were lost — two, if not three, of the asses being literally stung to death, and the other animals being never recovered after their dispersion. Many of the people were seriously stung about the face and hands."

Sometimes bees war with each other, two swarms taking a fancy to the same hive, or one swarm attacking another in order to steal its honey. These battles are at times terrific, lasting several hours or even days, the slain strewn the field of battle in great numbers.

In itself the sting of a bee is a small enough object, and does mischief out of all proportion to its size or appearance.

It would seem as though the anger of the bee was somehow conveyed to that organ and not only was the offender pierced by a pointed instrument but also by the bursting rage, rancor and hatred that at the moment possesses the little termagant. And this in a sense is true, for in a sac oblong, white in appearance, and not much larger than a pin head is stored up a vile fluid composed largely of formic acid, and an organic poisonous principle. This sac communicates with the hollow sting, and into the wound made by that weapon the acrid poison is viciously pumped.

The sting is located at the extremity of the abdomen, and the bee's abdomen, like that of other insects, is, as we know, composed of horny rings, each ring made of several parts. These rings



are joined to each other by flexible membranes, and fit together so that they may be drawn out and retracted something like the parts of a telescope.

It is this many-jointed abdomen with its flexibility, allowing movement in every direction; that makes the sting such an exceedingly effective weapon, the bee being able to twist its abdomen about and plunge its convenient dagger where it pleases.

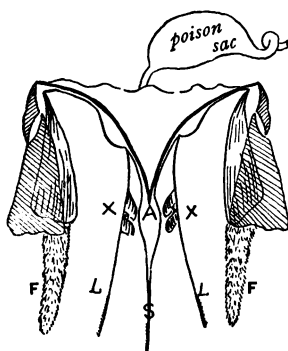
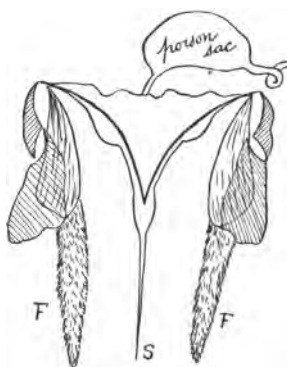
Hidden within the hindermost rings of the abdomen is the sting, which is not at all what it seems, for it appears to the naked eye as a smooth, slightly curved needle point, while in reality it is a complex and cruel weapon armed with lances and conveying a virulent poison.

When the bee desires to inflict a sting the spot is first investigated by a pair of delicate feelers (*F*) placed just behind the sting and pretty enough, one would think, to be put to a pleasanter use.

These little feelers work with lightning-like rapidity, and when a spot has been selected the sting (*S*) is thrust home, all in the twinkling of an eye.

The sting, like the bee's tongue, is not a simple tube, but is composed of several parts. With a good deal of care these parts can be separated and there is found to be an inner sheath bearing a

groove along its under side, and into this groove are accurately fitted two lances. The sheath is large at the top




where it widens into an oblong hollow pouch *A*, and it has two rows of microscopic backward-pointing teeth at its tip, although but one row can be seen at a time. The two lances are very slender, very sharp, and lie side by side in the groove on the under side of the sheath, fitting closely in their place. These lances can be pulled out of the groove as has been done at *L*, *L*. As they are hollow within, they and the sheath together form a tube. They are not stationary, however, but play up and down.

In order to prevent the lances from slipping out of place each is grooved along its outer edge, the grooves sliding over a corresponding projection that runs along either side of the sheath. Thus the lances ride up and down in the sheath, held safely in place no matter how quickly or violently they may move.

Each lance is viciously barbed at its point with ten stout hook-like projections that point backwards like the barbs on a fish-hook.

The poison-sac opens into the pouch *A* and on each lance where it lies in this pouch is a curiously constructed valve (*X*) which acts like the piston in a pump and pushes the poison through the tube in the sting as the lances are thrust down.



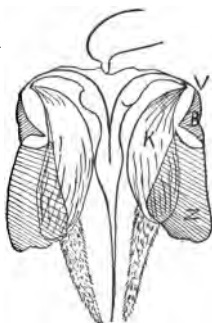
The poison is supplied by a long, slender white gland which at length branches into two and lies coiled up like a white thread in the abdomen, ending near the stomach in flattened knobs and opening below into the poison-sac.

When the bee stings, the end of the sheath is first driven into the skin and held fast by the barbs at the end. It now acts as a guiding rail as one after the other the lances are forced down, at each thrust going deeper into the victim. The poison escapes from the interior tube through openings on the lower barbs of the lances.

The wound inflicted by the sting of the honey-bee is very minute, being not more than one twelfth or one fifteenth of an inch deep and only one five hundredth of an inch in diameter. So far as the mere puncture is concerned it does no more harm than a prick from the finest cambric needle, but when into these little wounds the stinging poison is pumped that is another story. As soon as the sting enters, the poison is pressed out of the poison-sac by muscles provided for the purpose, and ejected into the wound with spirit and precision.

The method of working the lances is very ingenious, three horny plates on either side, *K*, *B*, *Z*, acting as levers to move the long curved rods *V*, *A*, *S*.

The sheath separates at *A*, *A*, one half curving to the right, the other to the left, the dark line bordering the inner edge of the curve on either side representing the guiding rails in which the lances ride, for the lances also curve away from each other at *A*, *A*, following the divisions of the sheath. The lances reach beyond the sheath, and at *V* on either side are articulated to the horny plate *B*, which in turn is articulated to the plate *Z*.



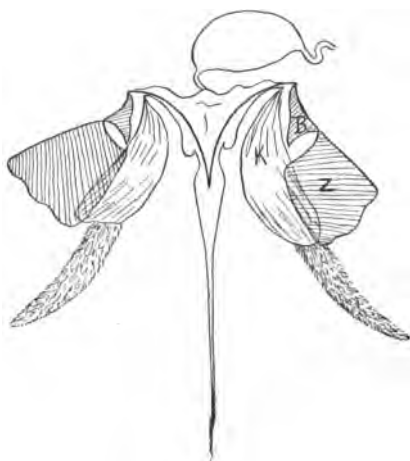
These plates act as levers and when they raise the point *V* the tip of the lance is lowered ; when they depress the point *V* the tip is raised.

The plate *K* attached to the upper termination of the sheath acts in a similar manner, lowering and raising the tip of the sheath.

Muscles attach the plates *B*, *K*, *Z*, to the inner side of the abdominal walls and by contraction move them, when, as has been described, they act as levers upon the long

curved rods, moving sting and sheath up and down independently of each other.

In the illustration on page 97 the sting is entirely withdrawn ; in the following one it is forced out to its full extent,



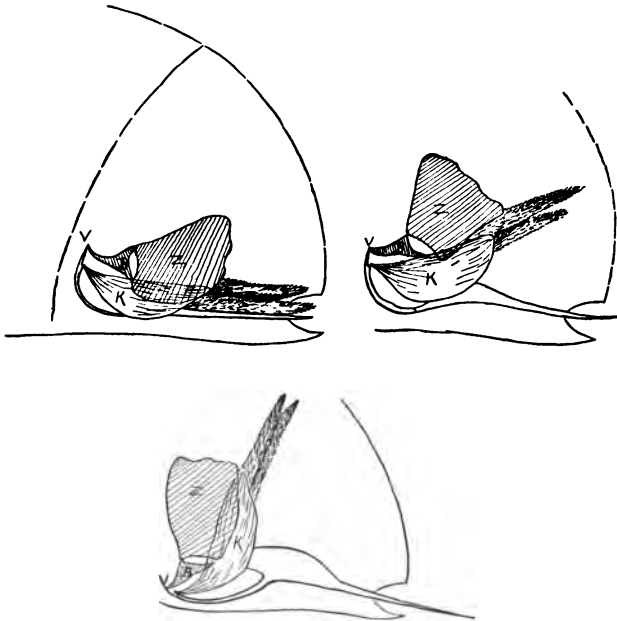
and it will be noticed that the left-hand lance is a little the lower.

The foregoing illustrations are taken from a sting, the upper parts of which have been flattened out somewhat, in order to get an unobstructed view of the working apparatus ; in nature the two sides of the sting are folded towards each other so that the plates *Z*, *Z*, for instance, are more nearly parallel instead of, as in the picture, standing on the same plane.

A side view of the sting in its natural position in the bee makes the working of the mechanism clearer.

Bee-poison expresses the concentrated anger of the bee, and to that is generally added more or less anger of our own, which probably assists the action of the other.

Bee-poison, composed largely of formic acid and an organic poison, is a most harmless-looking, colorless liquid, which may be seen hanging to the sting of an angry bee like a sweet and pearly dew-drop. But be not deceived,



Side view of the sting.

it is no dew-drop, but the very essence of wrath, a most active and virulent poison, more pervading even than the venom of the serpent or the poison of hydrophobia, for those may be taken into the stomach with impunity, while this is as vicious there as when received into the blood through the skin.

When the poison is placed upon the tongue there is a

slight burning sensation, quickly followed by an agonizing, acrid, metallic taste and a sharp stinging impression.

Curiosity may tempt many to taste bee-poison once, but few will voluntarily repeat the experiment. It can be quickly washed from the tongue with cold water and should not be swallowed as it may give rise, even in this small quantity, to very grievous sensations !

Bees show a diabolical aptitude for selecting sensitive parts, and Butler says : —

“ When they are angry, their aim is most commonly at the head, and chiefly about the eyes, as knowing that there they may do most harm, for that part swelleth most and longest ; and yet I never heard that any ever stung the very eye : as if they were forbidden to touch that tender part.”

Bee-keepers occasionally get a jet of poison in the eye, however, it being thrown out by an angry bee ; the feelings of the victim upon such occasions may be left to the imagination.

When one is stung, the part swells and burns, and if the sting is about the face the head aches considerably for awhile.

But on the whole it is soon over with most people, though some are so sensitive to this particular poison that even one sting is dangerous to them.

Cicero considers inability to endure a bee-sting a mark of very great effeminacy, as he tells us in “ The Tusculan Questions ” : —

“ We, if the toe pain us, or the tooth, if a stitch is felt in the body, are unable to bear it ; for there is a certain effeminate and light opinion in currency, not more in regard to pain than to pleasure, which, when it has melted us, and we flow with softness, we cannot withstand the sting of a bee without exclamation.”

Bee-poison seems to be derived, by some strange alchemical process, from the nectar and pollen of flowers, and

bee-stings are most virulent in the summertime when the honey-flow is at its height ; while in the winter they are comparatively harmless.

The ancients did not know what to do for bee-stings. Pliny frankly admitted that he knew of no remedy, and we of to-day are little better off, as application proves most of the remedies recommended to be useless or worse than useless.

Butler's advice is doubtless as good as any : —

“ When you are stung, instantly wipe out the bee, sting and all, and wash the place with your spittle ; so shall you prevent both pain and swelling, which otherwise nothing but time can cure : for the poison is so subtle that it quickly penetrateth the flesh and the wound so small that no antidote can follow after.”

Probably cold water very gently applied is as good as anything, for this reduces the inflammation, and very likely the use of mud so commonly recommended for stings is valuable because when once put on it precludes rubbing or other irritation and cools the inflamed part.

Above all things the wound should not be rubbed.

But first of all the sting should be taken out. For the pity of it is that the poor passion-blinded little morsel jabs it in and as a rule cannot get it out again !

Those numerous barbs hold too well.

In her fright, assisted by an agonized brush from your hand, she tears loose — and goes off minus her sting, helpless and wounded, for she leaves both sting and poison-sac behind her.

It is said that if one is patient and strong-minded he will stand perfectly still and let her work it out again, walking around and around the wound as a man twists a corkscrew out of a cork, and that then she will not lose it, and the sting will not hurt as much as when it is left in.

But few of us are self-controlled enough for that — and moreover what guarantee have we that she would not, finding herself free, angry and still potent, turn about and reward our forbearance with another stab? We prefer her death to our own pain, so we hasten her movements and shorten her life.

For the wages of anger in this case are death. Deprived of her sting and poison-sac and incidentally torn and wounded internally she soon dies — a sadder and a wiser bee — but as is often the case with those who learn wisdom by experience, acquiring that valuable attribute too late to profit by it.

When she thus leaves her sting as a legacy in the wound the poison continues to be forced out by the involuntary action of the muscles surrounding the poison-sac and of those driving the sting, which is the reason the sting should be extracted at once, a matter very easily accomplished.

The sting should not be grasped between the fingers, as this squeezes the poison out of the sac into the wound, but it should be brushed or scraped out in a direction opposite to that in which it entered, or lifted out by inserting the blade of a knife or the finger-nail beneath it, as one withdraws a tack.

The ancients knew the fatal consequences to the bee of using the sting, and Aristotle says : —

“When they have stung anything they perish, for they cannot withdraw their sting from the wound without tearing their own entrails ; but they are frequently saved, if the person stung will take care to press the sting from the wound ; but when its sting is lost, the bee must perish.”

And Pliny gives us the following : —

“Nature has provided bees with a sting, which is inserted in the abdomen of the insect. There are some who think that at the first blow which they inflict with this

weapon they will instantly die ; while others, again, are of opinion that such is not the case, unless the animal drives it so deep as to cause a portion of the intestines to follow ; and they assert, also, that after they have thus lost their sting they become drones, and make no honey."

It is true, oh, ancient and respected naturalist, that, having lost its sting, our bee makes no more honey, but that it thereby becomes a drone is too much for a scientific age to credit.

Bees appear to be ever conscious of their stings. They never forget to use them, no matter how frightened they are or how suddenly attacked.

If a bee deliberates, it stings ; if it loses presence of mind, it stings ; if it happens to think of it without any provocation at all, it stings.

Their reputation in olden time was as bad as it is to-day, and Virgil says of them, —

"They are wrathful above measure, and when provoked breathe venom into their stings and leave their hidden darts fixed in the veins and lay down their lives in the wound."

While Seneca feelingly remarks, —

" Bees are the most angriest and fellest creatures that be, according to the capacitie of their bodies, and leave their stings in the wound."

It is only fair to say that bees differ in disposition, and that while some varieties are extremely "handy with their weapons," and not at all slow to anger, other kinds are much less easily provoked.

The Italian bee has an enviable reputation for temper, though occasionally a hive of Italians is ugly enough, and one would do well to think twice before going too near, and then not go.

Concerning the dispositions of bees, Moffett says : —

"Bees, even by nature, are much different: for some are most domestical and tame, and other again are altogether wilde, uplandish and agrestial. Those former are much delighted with the familiar friendship, custom and company of men, but these can in no wise brook or endure them, but rather keep their trade of Honey-making in old trees, caves, holes, and in the ruders and rubbish of old walls and houses."

Doubtless, Columella was right where, speaking of different kinds of bees, he says: —

"But, nevertheless, the angry disposition of bees of a better character is easily mitigated and softened by the continual intervention of those who take care of the beehives; for they grow quickly tame when they are often handled."

One going among bees should be slow and deliberate, making no quick motion; and there is no doubt that bees tolerate some people and will not be approached by others. It has been suggested that the emanations of the body are the cause of their dislike, which the following story told by Bevan would seem to prove.

"M. de Hofer, Conseilleur d'État du Grand Duc de Baden, had for years been a proprietor and admirer of bees and rivalled Wildman in the power he possessed of approaching them with impunity. He would at any time search for the queen, and taking hold of her gently, place her on his hand. But he was unfortunately attacked with a violent fever and long confined by it. On his recovery, he attempted to resume his favorite amusement among the bees, returning to them with all that confidence and pleasure which he had felt on former occasions; when, to his great surprise and disappointment, he discovered that he was no longer in possession of their favor; and that instead of being received by them as an

old friend, he was treated as a trespasser ; nor was he ever able after this period to perform any operation with them, or to approach their precincts, without exciting their anger. Here then it is pretty evident that some change had taken place in the Counsellor's secretions in consequence of the fever, which, though not noticeable by his friends, was offensive to the olfactory nerves of the bees."

There is no mistaking a bee's intentions when it has made up its mind to sting.

It leaves the even tenor of its way, flies straight at you, buzzes angrily about your head for a moment, and then grips you. It clings fast with its feet in a most disagreeable and suggestive manner. and if you succeed in brushing it off before it stings, it is immediately felt in another place, and before you can strike it there in all probability it has struck you, and you dash it away ; and if you are wise instantly follow the advice of Butler, which, though given in 1609, is still timely : —

"When you are stung, or any in the company, yea, though a bee have stricken but your clothes, especially in hot weather, you were best be packing as fast as you can : for the other bees smelling the rank savor of the poison cast out with the sting, will come about you as thick as hail."

And further he adds : —

"Then is there no way to appease them but flight : the more you resist, the fiercer they are. They are like unto incorrigible shrews : there is no dealing with them but by patience, though when they sting they are sure to have the worst. For the wound endangereth neither life nor limb : two nights' sleep will take away the swelling, and two minutes the pain, unless it be in very rheumatic bodies : of which sort I have known some so swollen and disfigured with that little stroke that you could scarce know them by their favour in five or six days after."

Individual bees differ as much as colonies in the quality of their temper, and while one may be altogether "ram-bunctious" others from the same hive may not be so at all.

When one entertains bees on the window-pane there is good opportunity to observe the readiness with which they resent a fancied menace.

Of all bees honey-bees seem the most irascible. Touch one and quick as a flash out comes its sting.

They even gather bees they meet on their prison pane in a deadly embrace, the two strangers locking arms, so to speak, and politely driving at each other with their stings. But when this little neighborly greeting has been exchanged, if one does not succeed in piercing the other they frequently part friends, like men after a duel, one feeding the other in the most hospitable manner.

All the wickedness in a bee seems to be concentrated in its sting end; its heart may be good, but its sting is utterly bad and will fulfil its vengeful desires even when separated from the bee.

If a sting which has been newly extracted, either by the bee itself in a destructive paroxysm of anger, or by the operator after her ladyship the bee has been duly and mercifully chloroformed, be placed upon the finger, a very curious result follows.

Watching the organ through a magnifying lens one is interested in the involuntary muscular movements, but presently a very suggestive prick calls attention to the pointed end, and lo! this isolated sting is at work upon its own account. It has managed to insert the barbs into your skin and, with all its powers rallied for one last act of requital, is driving the weapon home!

This is amusing until you undertake to extract the venomous atom in time to avoid the poisoning scene in the last act, when you find the barbs have done their work also, and

before you can get free you have received a copiously poisoned sting, as fine a one as ever was administered by a living bee.

There is something almost uncanny in the way this unconnected thing moves about and wreaks its vengeance.

It "continues on life," as the "Arabian Nights" would say, apparently for the sole purpose of hurting somebody.

It will not attempt to enter a hard object, but the touch of your finger seems to arouse its old passion, and rallying its dying forces it "gives it to you" once again.

These "posthumous works of the bee," as they have been called, surpass all other posthumous works in the vividness of impressions they create.

While bee-poison is volatile and easily soluble in water, it is preserved by honey, and one occasionally has the unique, if not pleasant experience of a sting in the mouth from having partaken of honey in which a bee had been accidentally incarcerated and its sting left behind.

In spite of her very effective weapon, the skilful bee-keeper can handle my lady, the bee, bare handed and with perfect safety, human intelligence having circumvented the wise little bee, no doubt persuading her it is for her own good that man manipulates her hives and carries off her honey.

Who can blame the bees for using their weapons when occasion requires? No other insect has such treasure to defend, no other possesses a hoard of sweets so abundant and so greatly desired by other creatures. Their stings are their one means of self-defence, and no wonder they understand and profit by them.

While an occasional bee-sting is a matter of no consequence to most people, to be stung many times at once may be a very serious affair.

Thorley tells an affecting tale of a man who undertook to remove a swarm of bees from a tree.

He climbed to the hole, swept the bees out with a brush of weeds, and stopped up the hole so they could not return.

"This done," continues Thorley, "down he came surrounded with the enemy, resolved to revenge so great an injury, though with the loss of their lives. They fell upon him with the greatest fury imaginable, indeed affecting to behold, but I durst not offer him any assistance or relief. They charged him in flank, front and rear; clung to him, like ivy to the tree; got under his covering, into his hair, and under his clothes; and stung him from head to foot: he in like manner defended himself to the utmost of his power, fighting gallantly and slaying without mercy; but having no second, suffered extremely.

"It was a considerable time before the battle was ended, and he had entirely disengaged himself, at which time I suffered him to come to me, when hundreds of stings stuck in his hat, mittens, etc., besides a considerable number left in his body, the poison of which presently inflamed his blood and threw him into a violent fever which threatened his life. To bed he went; the fever increasing, his life hung in suspense for at least two entire days. Toward the close of the third day it began to abate; and being a man of a strong and vigorous constitution he recovered, and in a few days more was perfectly well, to the great joy of his family, and other friends."

Thorley believed that about a third of the bees were destroyed in this engagement.

There are many cases on record of people being stung to death, and Aristotle and Pliny mention that animals as large as horses have been known to be set upon and killed by bees.

Mules are apt to suffer greatly from bees, being of a natural disposition which forbids them to run when set upon. When stung by a bee a mule kicks, and if it chances

to kick over a hive every bee in it is eager to give the mule a touching proof of its feelings towards the destroyer of homes.

It once happened that a hapless donkey kicked over a whole apiary when it soon swelled to proportions never attained by a donkey in an equal length of time under any other circumstances, and perished on the spot.

The best remedy when attacked by a number of bees is to go into the house, as bees will seldom follow one indoors.

Too much bee-poison may prove as fatal as any other poison, to say nothing of the frightful nervous excitement caused by such a terrible event.

While many stings received at one time may be the cause of great suffering, or even loss of life, it is well known that a few stings received at intervals give most people immunity from the poison, and that one who handles bees and has been stung a number of times sometimes comes to mind it little more than a mosquito bite.

One bee-keeper is said to have advised his pupils to allow themselves to be stung!

Just how many inoculations are necessary to the production of this convenient immunity is not stated, and whether a "virus" of bee-poison can be made for common use remains to be seen.

There is a story current of a noted bee-keeper who being ornamented with a bald head, a most inconvenient blessing for a bee-keeper, one should suppose, in the height of the fray when many swarms had to be hived and handled in a limited time, was seen going placidly about with the top of his head plentifully adorned with bee stings, he not having troubled himself even to remove them!

As prevention is better than cure — particularly in the case of bee-stings — those needing to handle bees some-

The Honey-Makers

times cover their hands with certain aromatic substances, one of the most popular of which is oil of wintergreen ; when for some reason best known to themselves the irate little insects discovering the foreign substance with their sensitive feelers decline to add their own aroma to it.

But better even than wintergreen oil is the advice given by Butler : —

“ If thou wilt have the favor of thy bees, that they sting thee not, thou must avoid such things as offend them : thou must not be unchaste or uncleanly ; for impurity and sluttiness (themselves being most chaste and neat) they utterly abhor ; thou must not come among them smelling of sweat, or having a stinking breath, caused either through eating of leeks, onions, garlick, and the like, or by any other means, the noisomeness whereof is corrected by a cup of beer ; thou must not be given to surfeiting or drunkenness ; thou must not come puffing or blowing unto them, neither hastily stir among them, nor resolutely defend thyself when they seem to threaten thee ; but softly moving thy hand before thy face, gently put them by ; and lastly, thou must be no stranger unto them. In a word, thou must be chaste, cleanly, sweet, sober, quiet, and familiar ; so will they love thee, and know thee from all others. When nothing hath angered them, one may safely walk along by them ; but if he stand still before them in the heat of the day, it is a marvel but one or other spying him, will have a cast at him.”

The advantage of following the above advice is that whether it has the desired effect upon the bees or not, it cannot fail, in most parts, to be of benefit to the one who practises it.

Further, Cotton thus quaintly and kindly advises us concerning the handling of bees : —

“ If you want to do anything to a single bee, catch him

‘as if you loved him,’ between your finger and thumb, where the tail joins on to the body, and he cannot hurt you.”

If you want to do anything to your whole hive of bees, however, it is impossible to follow Cotton’s advice, and instead you would do well to wear a bee hat, which has a broad brim and a veil fitting over the shoulders.

And unless your bees love you as well as you them, it would be well to put on gloves and tie them over the ends of your sleeves above the wrists.

Although bee-poison produces such an unpleasant effect upon healthy people it is known to possess valuable medicinal properties, and in an early number of the “*Bienenzeitung*” we read of a man who discovered a use for bee-stings that would have delighted Moffett and his predecessors, who were so puzzled to find a good use for these weapons. The man in question had rheumatism, and while handling his bees was stung upon the rheumatic member, when, greatly to his surprise, all traces of rheumatism disappeared. Profiting by his discovery he repaired to the apiary upon the next appearance of the disease and induced his bees to sting him into health again.

Others have testified to a similar experience, and moreover bee-poison has a recognized place in medicine, being used in diphtheria, eye diseases, hydrocephalus in young children, erysipelas, cholera, certain fevers, and other diseases.

Constantine Hering says : —

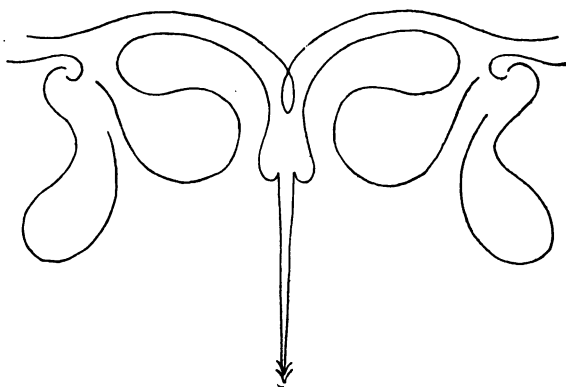
“Among all our drugs this is the one of which we have the most preparations. There is but one right kind. It is the pure poison, which is obtained by grasping the bee with a small forceps, and catching the minute drop of virus suspended from the point of the sting, in a vial or watch crystal.”

From the Homœopathic Pharmacopœia we get the following:—

“Draw out the sting together with the poison-bag from bees freshly killed. Taking hold of the bag, insert the point of the sting into a small glass tube and squeeze the poison into it. Or take a live bee with a pair of pincers and allow it to take hold of a small lump of sugar. It will immediately sting into the sugar which will absorb the poison. Repeat this process until enough is accumulated to start a trituration.”

Sometimes whole bees are used ; in which case, the “live bees, put into a bottle, are irritated by shaking, and then drenched with five times their weight of dilute alcohol, and allowed to remain eight days, being shaken twice a day. The tincture is then poured off, strained, and filtered.”

Sometimes the bee-keeper is requested to supply bee-stings, instead of bees or honey, not for the pleasure but for the cure of ailing man.



VIII

THE FAMILY

The Queen

EACH hive has long been known to possess one bee different from the others, and which received special care and attention from them.

This the ancients called a king.

Says Pliny : —

“The kings have always a peculiar form of their own, and are double the size of any of the rest ; their wings are shorter than those of the others, their legs are straight, their walk more upright, and they have a white spot on the forehead, which bears some resemblance to a diadem : they differ, too, very much from the rest of the community, in their bright and shining appearance.

“The obedience which his subjects manifest in his presence is quite surprising. When he goes forth, the whole swarm attends him, throngs about him, surrounds him, protects him, and will not allow him to be seen. At other times, when the swarm is at work within, the king is seen to visit the works, and appears to be giving his encouragement, being himself the only one that is exempt from work : around him are certain other bees which act as body-guards and lictors, and careful guardians of his authority.

“When they are on the wing, every one is anxious to be near him, and takes a pleasure in being seen in the performance of its duty. When he is weary, they support him

on their shoulders ; and when he is quite tired, they carry him outright."

Even as late as the time of Shakespeare the monarchical character of life in the hive was a matter of faith as we learn from " Henry V.," where the Archbishop of Canterbury, in talking to the king, uses the bees in illustration, —

" For so work the honey-bees,
Creatures that by a rule in nature teach
The act of order to a peopled kingdom :
They have a king, and officers of sorts ;
Where some, like magistrates, correct at home,
Others, like merchants, venture trade abroad,
Others, like soldiers, armed in their stings,
Make boot upon the summer's velvet buds ;
Which pillage they with merry march bring home
To the tent-royal of their emperor,
Who, busied in his majesty, surveys
The singing masons building roofs of gold,
The civil citizens kneading up the honey,
The poor mechanic porters crowding in
Their heavy burdens at his narrow gate,
The sad-ey'd justice, with his surly hum,
Delivering o'er to executors pale
The lazy yawning drone."

The bee which the old writers called the king is to-day called the queen. It is known to be a female, the only perfect female in the hive. It is also known that she is not a queen. She is a mother, the mother of all the colony.

The great mass of bees are the workers, which are imperfect — that is, undeveloped — females, unable as a rule to produce eggs.

The drones, comparatively few in number, are males.

The sex of the worker-bees, which are the ones we see flying about, is now well-known ; but in poetry and literature the conventional masculine pronoun is always applied

to them, as, for instance, in Gay's "Rural Sports" we read, —

"The careful insect midst his works I view,
Now from the flowers exhaust the fragrant dew,
With golden treasures load his little thighs,
And steer his distant journey through the skies."

Butler in 1609 knew the sex of the so-called king and says : —

"Aristotle entreating of the breeding of bees professeth himself uncertain of their sex : and therefore, (willing, in this uncertainty, to grace so worthy a creature with the worthier title) he everywhere calleth their governor, Rex. As many as followed him, (searching no further than he did) were content to say as he said. So that I am enforced (unless I will choose rather to offend in *rebus*, than in *vocibus*) by their leave and thine (learned Reader) to strain the ordinary signification of the word *Rex* ; and, in such places, to translate it *Queen* : since the males here bear no sway at all ; this being an Amazonian or Feminine kingdom."

It is true that Aristotle was puzzled about the sex of bees, and that it was nearly two thousand years after his time before the matter was indisputably settled, and yet in his "History of Animals" we read this very remarkable statement. Speaking of the "kings," or "rulers," he says : "By some they are called the mother-bees, as if they were the parents of the rest ; and they argue that unless the ruler is present, drones only are produced, and no bees. Others affirm that drones are males, and the bees females."

Thus in Aristotle's time was guessed the truth that the scientists of another age were to demonstrate.

Young bees are produced from eggs laid by the so-called queen, — a fact not known to the ancients, who had various

theories concerning the origin of bees, the most popular of which we will let Aristotle state.

"All persons are not agreed as to the generation of bees, for some say that they collect them from the flowers of the honeysuckle, and others from the flowers of the calamus. Others again say that they are found in the flowers of the olive, and produce this proof, that the swarms are most abundant when the olives are fertile. Other persons affirm that they collect the young of the drones from any of the substances we have named, but that the rulers produce the young of the bees."

Virgil has the bees gather their young from leaves.

"Chiefly will you marvel at this custom peculiar to bees, — they themselves cull their progeny with their mouths from leaves and fragrant herbs; they themselves raise up a new king and little subjects, and build new palaces and waxen realms."

The pretty fancy that the bees gathered their young from flowers and leaves lingered for centuries, opposed, as we know, by the less pleasing theory that bees were bred spontaneously from carcasses.

Moffett in his "Theatre of Insects" gives us the seventeenth-century idea on the subject, from which we learn that some at least, still believed in the theory of the carcass, which had not suffered for want of elaboration as time passed.

"Forasmuch as Philosophers have given out that bees (for the first sin of mankind) are begotten of putrefaction; there are not wanting those that deny they were created in the first week of the world.

"Of the first generation of Bees Aristotle hath a long discourse. The Philosophers following him have rightly determined in my opinion, that their generation doth proceed from the corruption of some other body: as of a Bull, Oxe, Cow, Calf, very excellent and profitable beasts: the which

not only worthy men and without all exception do report ; but even rustical and common experience doth confirm. They say that out of the brains of these beasts are bred the Kings and Nobility, and of their flesh the common sort of ordinary Bees. There are likewise kings that are bred out of the marrow of the chine-bone, but then those that come of the brains do far excell the other in feature or comliness, in largeness, in prudence, and in strength of body."

Shakespeare alludes to the common superstition of the origin of bees from dead matter in "Henry IV." The king is railing against the prince, when Warwick defends him, saying he will in time forsake his evil companions, to which the king replies, —

"T is seldom when the bee doth leave her comb
In the dead carrion."

The modern queen-bee certainly has no spot, like a diadem, glittering on her brow, as Pliny relates, but she is fairly entitled to the pleasant praise of Butler, who informs us, —

"The queen is a fair and stately bee, differing from the vulgar both in shape and color: her back is all over of a bright brown; her belly, even from the top of her fangs to the tip of her train, is of a sad yellow, somewhat deeper than the richest gold," and the remainder of Butler's description of the queen is as accurate and far more picturesque than can be found in the modern bee-books.



Queen-bee.

"She is longer than a honey bee, by one third part, that is, almost an inch long: she is also bigger than a honey bee; but not so big as a drone, although somewhat longer: her head proportionable, but that is more round than the little bees, by reason her fangs

be shorter: her tongue not half so long as theirs: for whereas they gather with the one nectar, with the other ambrosia; she hath no need to use either, being to be maintained, as other princes, by the labor of her subjects: her wings of the same size with a small bee's, and therefore with respect of her body long, they seem very short, resembling rather a cloak than a gown; for they reach but to the middle of her train or nether part: her legs proportionable, and of the colour of her belly, but her two hind legs more yellow; her nether part so long and half so long as her upper part."

We know that the queen does receive peculiar attention from the other members of the hive; as Langstroth says, —

"The queen is treated with the greatest respect and affection by the bees. A circle of her loving offspring often surround her, testifying in various ways their dutiful regard: some gently embracing her with their antennæ, others offering her food from time to time, and all of them politely backing out of her way, to give her a clear path when she moves over the combs."

So strong is the feeling of the workers for the queen that if for any reason she is removed, the whole hive is filled with consternation and dismay, and speedily falls a victim to despair. Her death, when it is too late in the season to raise another queen, means the final extinction of the colony. The bees know that a terrible calamity has befallen them, their family is doomed, and they lose all heart and all their eagerness to work.

Huber experimented upon his bees by carefully removing their queen, and he tells us, —

"Bees are not immediately aware of the removal of their queen: their labors are uninterrupted; they watch over the young, and perform the whole of their ordinary occupations. But, in a few hours, agitation ensues, — all

appears a scene of tumult in the hive. A singular humming is heard ; the bees desert their young and rush over the surface of the combs with delirious impetuosity. Then they discover that their queen is no longer among them. But how do they ascertain it? How do the bees on the surface of one comb discover that the queen is or is not on the next comb?

“I cannot doubt that the agitation arises from the workers having lost their queen, for, on restoring her, tranquillity is instantly regained among them ; and, what is very singular, they *recognize* her—you must interpret this expression strictly. Substitution of another queen is not attended with the same effect, if she is introduced into the hive within the first twelve hours after removal of the reigning one. Here the agitation continues, and the bees treat the stranger just as they do when the presence of their own leaves them nothing to desire. They surround, seize, and keep her a very long time captive, in an impenetrable cluster, and she commonly dies either from hunger or privation of air.”

Virgil gives us this pleasant picture of the love of the bees for their queen :—

“Besides, not Egypt’s self, nor great Lydia, nor the nation of the Parthians, nor Median Hydaspes, are so observant of their king. Whilst the king is safe, there is one mind among all : when he is dead, they sever their allegiance ; they themselves tear to pieces the fabric of their honey, and demolish the structure of their combs. He is the guardian of their works : him they admire, and all encircle him with thick humming, and guard him in a numerous body ; often they lift him up on their shoulders, expose their bodies in war, and through wounds seek a glorious death.”

Although the facts do not sustain this romantic descrip-

tion, there is no doubt that the queen owes her reputation for royalty to the peculiar conduct of the bees about her and yet she is in no sense a ruler. She does not issue commands nor examine the work done with a view either to criticise or to advise, nor does she indulge in royal idleness.

On the contrary, no bee in the hive performs so stupendous a task as she.

There may be over a hundred thousand bees hatched in one season, and of all these she alone is the mother.

A good queen will sometimes lay three thousand five hundred eggs a day, or nearly double the weight of her own body, and continue doing it for several weeks in succession.

What enables her to perform this apparent miracle?

Two things, — her advantageous physical start in life, for she is the best nourished of all the bees, and the great care she receives from the workers.

She is in reality from the time she begins her maternal task little more than an egg-laying machine.

As she has no responsibility of finding nectar or building waxen cells, or even of caring for her own wants, she has no use for the highly developed nervous organization that distinguishes the worker bees, and we find this mother of the hive possessed of a small head, a small brain, and a simple understanding. Her antennæ contain but two-thirds as many sense organs as those of the workers, and her compound eyes have each somewhat less than five thousand facets, while the workers' contain over six thousand.

Her digestive power is so imperfect that the worker bees are obliged to eat and digest the pollen for her, secreting a rich nutritive fluid which the queen obtains by putting her short tongue into the open mouths of the workers.

Fed thus upon extremely nutritious and already digested

food, the queen is able to maintain the necessary heat of the body and produce an enormous number of eggs.

We are not surprised to learn that no pollen baskets have developed upon her legs, and that her hairs are but slightly branched.

If carefully prepared food is necessary to the usefulness of the queen as an egg-producer, it is no less necessary to her formation in the first place, and she has the best of the good things to eat from the time she leaves the egg.

The worker bees build sheets of honey-comb, which are suspended from the top of the hive. As we buy the honey-comb to-day in small boxes weighing a pound or two, we see only one kind of comb, that in which honey is stored. These honey cells are the same as those in which the drone eggs are laid, and the young drones reared. The honey-comb becomes a cradle for bees or a store-house for honey at the will of the bee. But in every hive at the beginning of the season there are built combs of cells like the honey cells, but one-fifth smaller.

There are often a great many of these, and they are the cradles of the young worker bees.

Later the bees build a number of large thimble-shaped cells, generally on the edges of the comb, and with their mouths opening downward. These are queen cells, concerning which Pliny says, —

“In the lower part of the hive they construct for their future sovereign a palatial abode, spacious and grand, separated from the rest, and surmounted by a sort of dome.”

At the beginning of the season the queen lays fertilized eggs in the worker cells. She walks over the combs, puts her head into each open cell as she comes to it, as though to discover whether it was occupied already or was in fit condition to become the cradle of a bee. Satisfied with the state of the cell, she deposits in it a tiny oblong shining

white egg, which is glued to the bottom of the cell by one end, the ovipositor of the queen supplying a secretion for the purpose.

Later in the season the workers construct the large queen cells into each of which the queen deposits a fertilized egg in all respects like those laid in the worker cells.

Meantime the queen deposits unfertilized eggs in cells like those of the honey-comb, and these hatch into drones, for curiously enough the drone is the product of an unfertilized egg. If for any reason the queen fails to mate successfully, after a time she begins to lay eggs, but these all hatch into drones, — a calamity as great as the loss of the queen.

In about three days the eggs hatch into legless, maggot-like creatures, the larvæ, or "worms," as the bee-keepers call them, which are now supplied with food by the workers.

It is the food which makes the difference between the queen and the worker bees, notwithstanding Pliny's romantic statement on the subject : —

"The king, however, from the earliest moment, is of the color of honey, just as though he were made of the choicest flowers, nor has he at any time the form of a grub, but from the very first is provided with wings."

This tribute to royalty is more poetical than true, for the "king," like common folk, comes from an egg, and is a "grub" like the others, owing his ultimate superiority to his superior opportunities for gormandizing, royalty in this instance being a product of high feeding.

The bees feed the queen larva upon a very nutritious food called "royal jelly" secreted by them, giving it to her in unstinted abundance during the whole period of larvalhood.

Concerning it Benton says : —

"The composition of this food has been the subject of much attention and more theorizing. It may be considered as pretty certain that during the first three days of the life of the larva its food is a secretion from glands located in the heads of the adult workers, — a sort of bee milk, to which, after the third day, honey is added in the case of the worker larvæ, and honey and pollen in the case of drone larvæ. As this weaning proceeds, both worker and drone larvæ receive pollen, and in constantly increasing proportions, in place of the secretion. But this rich albuminous substance is continued to the queen larvæ throughout their whole period of feeding."

This highly nutritious food supplied unsparingly causes the queen larva in its roomy cell to develop into the large perfect female or queen-bee.

If the queen of the hive dies or disappears before the new queen cells are started, the workers, as soon as they have recovered from their agitation at missing her, go to a worker cell in which lies a fertilized egg, or to one in which is a worker larva not more than three days old, and enlarge it to about the size of the queen cell by breaking away the walls of the surrounding cells.

They carry away the eggs and larvæ contained in the broken cells, feed the favored infant on "royal jelly," and, presto! the obscure worker is become a queen.

Schirach proved by experiment that worker eggs could be transferred to queen cells and developed into queens, by receiving the queen's food.

Huber repeated Schirach's experiments, and numerous bee-keepers and naturalists since that time have verified the conclusion they reached, which, naturally enough, was at first regarded with scepticism.

The "royal jelly," with which all the larvæ are at first fed, is semi-fluid in consistency, and the young bees are

surrounded by it as soon as they hatch; indeed, they are partly suspended in it, probably absorbing it through the skin as well as taking it through the mouth.

The queen larva feeds upon "royal jelly" for about five and a half days, while the worker larva receives its less nutritious food for only five days, and the drone larva feeds for about six days.

During this time the bee grows from a tiny egg to about its full size, increasing from twelve to fifteen hundred times its weight, and consuming an amount of food that leaves no opportunity for idleness to the nurse-bees that supply these ravenous infants.

During the period of growth the larval bee, in common with the larvæ of other insects, finds its skin too small for its body and consequently sheds or casts off the uncomfortable covering half-a-dozen times. These cast-off skins are so extremely fine and delicate that for ages they escaped observation, and until very recent times it was believed the bee-larva did not shed its skin.

Finally, the nurse-bees put a porous cap or cover of wax and bee-bread over the cradle cells, and leave the occupants to their own devices.

Evidently they know the difference between the worker-bee and the drone, as they put flat caps over the worker cells and convex ones over the drones.

As soon as they are capped over, the imprisoned infants proceed to spin a delicate cocoon about the upper part of the cell, covering the head and extending partly over the body, the silk for it being supplied by certain glands in the head, and first appearing in the form of a liquid, which, being drawn out through an opening in the lip like thin threads of saliva, hardens into a tough, fine silk. The glands that yield the silk disappear in the adult queen and drone, but in the worker are transformed into the secreting

glands by which the larvæ and the queen and drones are supplied with food.

When the cocoon is finished the bee passes into the pupa stage, where it undergoes those marvellous transformations that change it from a legless, wingless, helpless "worm" to a perfect bee with its wonderful sense organs, its highly developed nervous system, its gossamer wings, and other organs.

At the end of the pupa stage the bees bite through the caps to their cells, and come forth to take their share in the outer world.

The whole period from the laying of the egg to maturity in the queen is about fifteen and a half days, in the worker twenty-one, while the drone requires twenty-four days to complete his metamorphosis.

When about to come forth the young queen begins to "pipe," — a sound that greatly agitates the queen-mother, who thus recognizes a rival.

Only one queen is tolerated in the hive at a time, and when a young one hatches the old queen kills it or else the bees "swarm;" that is, the old queen departs with the greater part of the older bees, leaving her daughter to assume the responsibilities of future generations.

As soon as this daughter finds herself free from her cradle cell, her first impulse is to dispose of possible rivals, and she deliberately uncaps any remaining queen cells and demolishes the innocent occupants by stinging them.

If two queens come forth at the same time, there is trouble indeed, and a duel immediately ensues which ends only with the death of one.

The queen stings only queens, and seeks to penetrate her rival between the rings of the abdomen, as the parts there are so soft that she can readily withdraw her sting uninjured. She may be handled and teased to any extent without being

provoked to use her weapon, which is as well her ovipositor, or egg-laying instrument, and which she will not run the risk of losing. It is larger than that of the worker, but is straight instead of curved, and but slightly barbed. Her poison-sac is small and less developed.

Aristotle knew of the queen's sting and tells us, — "the kings and rulers have a sting which they do not make use of, and some persons suppose they have none."

Butler says : —

"The spear she has is borne rather for show and authority than for any other use. For it belongeth to her subjects as well to fight for her as to provide for her."

Seneca, on the contrary, informs us that "their king hath no sting," and proceeds gravely to give us the reason: "Nature would not have him cruel nor to seek revenge that might hazard his life, therefore took away his weapon and disarmed his wrath."

He moralizes further : —

"All kings and princes ought to consider this excellent example." And would have a man's wrath, like a worker-bee's, "broken with his own weapon and have no more means to hurt than once in his life."

Virgil's account of a battle in the kingdom of bees is more spirited than true, as in reality the bees do not help the queen, but stand eager spectators, ready to carry out the body of the slain and pay homage to the victor.

"A voice is heard resembling the broken sounds of trumpets. Then in a hurry they assemble, quiver with their wings, sharpen their stings upon their beaks, prepare their sinews, crowd thick around their king and to his pavilion, and with loud hummings challenge the foe."

"The kings themselves, amidst the hosts, distinguished by their wings, exert mighty souls in little bodies, obstinately determined not to yield till the dread victor has compelled either these or those to turn their backs in flight."

The young queen, having established her right by battle, flies abroad and high in the air, mates, receiving from the drone a supply of fertilizing material which is stored in a small pouch designed for the purpose and the contents of which she is apparently able to use at will, fertilizing some eggs and leaving others unfertilized.

Browning, in his poem entitled "Popularity," refers to the flight of the queen, where Solomon in his robe of gold, sitting upon the throne in a room hung with tapestries of Tyrian blue, is

"Most like the centre-spike of gold
Which burns deep in the blue-bell's womb
What time, with ardors manifold,
The bee goes singing to her groom
Drunken and overbold."

A new race of bees can be formed in an apiary by removing the queen and introducing another impregnated queen of the desired breed. Since the new queen has power to fertilize her own eggs, her progeny will be pure; and since the workers and drones live but a few months, while the queen lives several years, after one season the hive will be peopled by the new stock. A beehive remains tenanted year after year by apparently the same bees, but as a matter of fact the workers and drones are constantly dying and constantly being renewed. Brief life is here their portion, and they live their few weeks or months and then, dying, make room for the new-comers that are ready to take their places and pass through the same brief period of life on earth.

The queen-bee has great tenacity of life, as well as longevity. She resists the effects of chloroform much longer than either worker or drone, and will often continue alive in conditions that have proved fatal to the workers confined with her.

The Italian bee has been introduced into this country by sending queen-bees from Italy, and this variety of bee is now very common here. It is a pretty bee, with the upper rings of the abdomen of a light tan color, a mark which distinguishes it at once from the common brown or German bee.

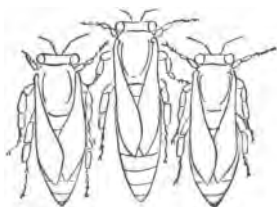
Queen-bees are raised in large numbers for exportation by Italian bee-keepers. By removing the queen the bees can be set to building queen cells and raising queens, and if the "brood" is watched and the young queens prevented from killing each other, large numbers can sometimes be taken from a hive in the course of a season.

The queen-bee, shut in a small box with a wire gauze covering, supplied with food and accompanied by two or three dozen workers for comfort and consolation, can be sent through the mails in safety for very long distances.

In a Texan bee journal we read the following interesting advertisement, —

"We will receive next month a fresh supply of the finest imported Italian queens to be had in Italy, also some Holylands from Jerusalem, in June, and Cyprians from Cyprus, in May. All direct from their native lands."

Bees have been sent by mail from Germany to California, to Australia, and to Calcutta, India.



IX

THE DRONE

THE drone occupies a position that is unique, but not enviable. He has been obliged to endure the slings and arrows of outrageous fortune in his own family, and also, from all time, the disapproval of the human race. This last misfortune, however, he is said to bear with extreme fortitude.

We find him abused in Greek and Latin as well as in all the modern tongues.

Aristotle and Pliny call him a thief.

Virgil says he is *ignavum fucos pecus*, while modern writers brand him as lazy and good-for-nothing.

“I would be loath
To be a burden, or feed like a drone
On the industrious labor of the bee,”

say Beaumont and Fletcher in their “Honest Man’s Fortune.” And Butler joins the hue and cry, saying, —

“The drone is a gross stingless bee, that spendeth his time in gluttony and idleness. For howsoever he brave it with his round velvet cap, his side gown, his full paunch, and his loud voice, yet is he but an idle companion, living by the sweat of others’ brows. He worketh not at all, either at home or abroad, and yet spendeth as much as two labourers: you shall never find his maw without a drop of the purest nectar. In the heat of the day he flieth abroad, aloft and about, and that with no small noise, as though

he would do some great act ; but it is only for his pleasure, and to get him a stomach, and then returns he presently to his cheer."

Moffett uses the time-honored privilege of abusing the drone, to whip, at the same time, his Roman Catholic brethren.

"Some have stings (as all true Bees have :) others again are without a sting, as counterfeit and bastardly Bees, which (even like the idle, sluggish, lither, and ravenous cloystered Monks, thrice worse than theeves) you shall see to be more gorbellied, having larger throats, and bigger bodies, yet neither excellent or markable, either for any good behaviour and conditions, or gifts of the minde. Men call them unprofitable cattle, and good for nothing, Fuci, that is, Drones ; either because they would seem to be labourers, when indeed they are not : or because that under the colour and pretence of labour (for you shall sometime have them to carry wax, and to be very busie in forming and working Honey-combs,) they may eat up all the Honey."

The ancients sometimes speak of the drone as if it were not a bee at all, but some other insect that made its nest with the bees. Some believed that it laid its own eggs and made its own cells, using the hive only as a convenient resting-place where it could get food at others' expense.

The following is Pliny's opinion of it : —

"The drones have no sting, and would seem to be a kind of imperfect bee, formed the very last of all ; the expiring effort, as it were, of worn-out and exhausted old age, a late and tardy offspring, and doomed, in a measure, to be the slaves of the genuine bees. Hence it is that the bees exercise over them a vigorous authority, compel them to take the foremost rank in their labours, and if

they show any sluggishness, punish them without mercy. If you deprive a drone of its wings, and then replace it in the hive, it will pull off the wings of the other drones."

Needless to say, it will not pull off the wings of the other drones if reduced to that unpleasant condition. Neither will it labor, no matter how mercilessly it may be punished.

After ages of scorn and contumely, it is time for some one to break a lance in the service of the drone.

It is time for some one to proclaim him for what he is, next to the queen the most important bee in the hive, and to demand that he be recognized as such by the old and the young, by the wise and by the foolish.

His destiny is a hard one, but he is not ignoble. He merits the crown of martyrdom, though he is the most cheerful martyr imaginable. He is the male bee; and if in other creatures his sex is pre-eminent, in him the tables are indeed turned, and he finds himself wholly at the mercy of the worker-bee, who has no mercy.

He is carefully nurtured in infancy, being, like the queen, fed on royal jelly.

He comes forth an innocent and happy bee, capable of enjoying life, but unfitted to share in the labor of the hive.

By no fault of his own he has a very short tongue, too short to gather honey from the flowers; he has also small weak jaws quite incapable of working in wax or performing any other difficult task. He has no wax glands, no honey-sac in which to convey sweets to the hive; no pollen baskets on his legs, and no well-developed gathering hairs on his body. So far as work is concerned, he is by destiny an aristocrat and suffers the fate of the aristocrat born into a communistic society.

He is large, being more bulky than the queen, though

not so long in the abdomen. His wings are large and powerful, though he does not use them often.

He has a large round head with particularly fine eyes, his great compound orbs covering the sides of his head and meeting on top, thus crowding the three simple eyes out of their places to a lower position between the compound eyes. Each eye contains the enormous number of more than thirteen thousand facets, the worker having only half that many.



The Drone.

He has thirteen joints to his antennæ instead of twelve, and these remarkable organs each contain nearly thirty-eight thousand smell-hollows.

Thus magnificently equipped with sense organs, he forms a striking contrast to his mother, the queen.

He is a handsome creature with his sheeny wings drooping about his bright form, making what Butler calls his "side gown." His back is covered by a soft golden-brown down as though he were clad in a jacket of fine velvet, and his legs are long, strong, and beautiful. He is less hairy than his sisters, the workers, though the end of his abdomen is fringed with rows of bright brown hairs. He is also less intelligent, for although his head is large, his brain is small.

On the whole, with his big eyes, velvety body, and gossamer wings, he is as pretty a bee as any in the hive, when regarded without prejudice, and he is certainly pleasanter to handle, as he never under any circumstances stings, one of his masculine peculiarities being the total absence of a sting.

If teased, he will sometimes go through all the motions of stinging, perhaps as an inherited remembrance of his mother's original power in that direction. And he will also threaten with his tiny jaws, showing plenty of mascu-

line courage, even though he lacks weapons to make it effective.

He will thrust his short tongue into a drop of honey given him, though he much prefers running to one of his sisters and getting her to feed him, which she is usually perfectly willing to do.

Like the queen, he is devoid of pollen-digesting glands, and thus all his life he is partly dependent upon his sisters for food.

He appears just before the swarming season as a rule, and there may be hundreds, or even thousands, raised in one hive.

Since each queen mates but once, and consequently only one drone is necessary to every swarm, the question arises as to why so many are produced.

Doubtless for two reasons,—that no time may be lost when a queen flies abroad, and that cross-fertilization may at least occasionally be insured.

The meeting between the queen and the drone takes place high in the air, and it is essential that the queen remain abroad as short a time as possible. Being large and conspicuous, she is in danger of falling a prey to insect-eating birds, or she may be blown into streams, or carried away by the wind and lost.

For these reasons it is also desirable that she be not obliged to fly forth more than once, as she assuredly will, if not successful in finding a mate the first time. On sunny days the drones fly abroad in the middle of the day, the time when the young queens go forth.

As soon as a queen takes flight, any drones that chance to be near follow. And now is explained the cause of the drone's splendid sense endowment and of his large strong wings. All of his superior equipment is needed to help him in the race. The victory is to the best, and thus are transmitted to posterity the qualities of the best.

But even here the strange Nemesis of the drone's life follows him. The victor puts forth his splendid powers to the utmost, succeeds, provides for the life of countless descendants, and as a result dies.

Nor is this the end of the tragic tale. As the season advances and the drones are no longer needed, they are slaughtered in the most ruthless manner by the workers. Huber gives a graphic account of this act of anticipative economy, he having constructed a glass support for his hives, beneath which one could lie and observe what took place within. He placed six hives upon the glass table, and this is what he says : —

“On the 4th of July, we saw the workers actually massacre the males in the whole six swarms, at the same hour, and with the same peculiarities. The glass table was covered with bees full of animation, rushing upon the drones as they came from the bottom of the hive ; they seized them by the antennæ, the limbs, and the wings, and, after having dragged them about, or, so to speak, after quartering them, they killed them by repeated stings directed between the rings of the belly. The moment that this formidable weapon reached them was the last of their existence : they stretched their wings and expired. At the same time, as if the workers did not consider them as dead as they appeared to us, they still darted it so deep that it could hardly be withdrawn, and they were obliged to turn round upon themselves before the stings could be disengaged.

“Next day, having resumed our former position, we witnessed new scenes of carnage. During three hours, the bees furiously destroyed the males. They had massacred all their own on the preceding evening, but now they attacked those which, driven from the neighboring hives, had taken refuge amongst them. We saw them also tear

some remaining nymphs of this species from the combs ; they greedily sucked all the fluid from the abdomen, and then carried them away. The following day no drones remained in the hives."

Often the bee-keeper anticipates the onslaught by the workers ; and when the drones go forth for an hour in the sunshine he narrows the entrance to the hive so that the workers can pass, but the drones, being larger, cannot return. When the banished ones have collected disconsolately on the outside of the hive, they are swept into a vessel of water, and to put the crown upon their misfortunes — ignominiously fed to the chickens !

The ancients also excluded the drones by narrowing the entrance to the hive, as we learn was done as far back as the time of Aristotle.

The edict of banishment by the bees themselves goes forth early or late in the season according to the condition of the storehouse. In a successful season the drones are tolerated longer than in a poor one. If the colony is weak or the honey flow slight, the drones may be cast out early in the summer, but under better circumstances they may be allowed to remain even as late as November. In a prosperous colony, however, they are sooner or later destroyed, excepting that occasionally a few will be tolerated through the winter.

The bee-life is in the strictest sense communal, and the death of the drones is necessary to the welfare of the community.

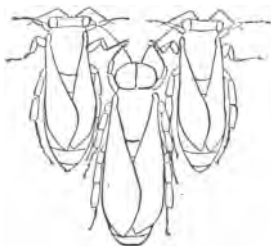
With the exception of their one function, they are worse than useless, supplying many mouths to consume the precious stores.

Idle members are a menace to the safety of the community, hence even such workers as become incapacitated are said to be ejected, and even the queen grown old or

useless is sometimes sacrificed by her whilom attentive subjects. As Pliny says, they know of nothing but what is for the common benefit of all.

The drones are the least tenacious of life of all the bees. When sent in a mailing box with queen and workers, several of them will generally arrive dead, and the others soon die, every drone having disappeared as a rule before a single worker succumbs. The drone is as easy to kill as the queen is difficult, a very short application of chloroform being sufficient to end his term of existence. He is more delicate than any of the bees, sipping daintily of prepared sweets, flying only for pleasure in the warm sunshine, disappearing with a breath or a rude touch. Since he dies so easily it may be that death is not painful to him ; he struggles not, but passes on.

His wing music is more sonorous than that of the other bees, giving a droning sound, from which he gets his name and by which he is easily recognized by a practised listener.



X

THE WORKER

It is the worker-bee whose praises have been sounded from remotest times. It is her industry, her wisdom, and her virtues that have been sung, and it is of her the great French naturalist, Latreille, in his "History of Insects," is moved to exclaim, —

"In the vast creation of insects, there is no one whose history presents to us such a prodigious number of wonders as that of the bee. In regard to industry, these insects are the *chef d'œuvre* of the creation ; and man himself, so proud of his natural gifts, is in some degree humiliated at the view of the interior of a bee-hive."



Worker.

The workers have smaller eyes than the drones and fewer smell-hollows in their antennæ, but these organs are better supplied with sensory hairs for feeling in flowers and comb cells, and their bodies are supplied with wonderful implements of usefulness that the drone knows nothing about.

In short, the worker-bees are a brilliant illustration of the blessings bestowed by labor. It is their ability and their willingness to work which has enabled them to vie with the highest of the insect race, one is almost tempted to say of any race. Work is their joyfully accepted portion from the moment they leave the cradle cell until life passes from them.

The young bee, as she issues from her cell, is a pretty, baby-like creature, pale gray, covered with down, and weak

in her actions. In two or three days she is in the heyday of strength and beauty. As she grows older and works harder, her youthful down wears off and she becomes darker and harder in appearance, for, as Moffett tells us, —

“Their young ones be not very nice or tender, nor cockeringly brought up, for being but bare three days old, as soon as ever they begin to have wings, they enjoin them their task, and have an eye to them, that they be not idle, though never so little.”

In reality, they do not have even three days' grace, for their wings are fully formed when they emerge from the cradle cell, and as soon as their damp hairs are dried and combed these mature infants proceed to “nurse” the ever-hungry occupants of the surrounding cradle cells.

They stay at home as a rule for two or three weeks and do the “house-work” of the hive, removing dead bees and other foreign matter, attending the queen and feeding her, secreting wax, and building new combs, caring for the larvæ and ventilating the hive.

When first hatched the bee appears to have no desire to collect honey, not even storing it in the cells, when it is given to her. She must first serve her apprenticeship in the hive before the desire awakens to go forth to the honey fields.

The glands of the bee, as of other creatures, are more active in youth, consequently the young bee is best able to secrete the royal jelly and the wax. She is thus by nature a “nurse,” and instinctively goes from cell to cell feeding her little larvæ foster-children from her abundant stores.

Aristotle and Pliny say that bees sit upon their young like hens, and Packard tells us the same, though in more scientific terms.

“The manner in which the bee performs her incubatory office is by placing herself upon the cell of a nymph (pupa)

that is soon to be developed, and then beginning to respire at first very gradually. In a short time the respirations become more and more frequent, until at length they are increased to one hundred and twenty, or one hundred and thirty, per minute.

"The body of the insect soon becomes of a high temperature, and, on close inspection, is often found to be bathed with perspiration. When this is the case the temperature of the insect soon becomes reduced, and the insect leaves the cell, and another bee almost immediately takes her place. When respiration is performed less violently, and consequently less heat is evolved, the same bee will often continue on a cell for many hours in succession. This extreme amount of heat was evolved entirely by an act of will in accelerating the respiratory efforts, a strong indication of the relation which subsists between the function of respiration and the development of animal heat."

The habit of placing a guard before their door, ascribed to the bees of antiquity, is the habit of the bees of to-day, as can be proved by striking the hive, when out rush the sentinels to learn the cause of the disturbance.

Sir John Lubbock ascertained by marking the bees that came out, and then calling them up at intervals, that the same ones stood on guard for at least several days in succession.

"Bees," says Huber, "preserve a sufficient guard, day and night, at the entrance of their habitation. These vigilant sentinels examine whatever is presented, and, as if distrusting their eyes, they touch with the antennæ every individual endeavoring to penetrate the hive, and also the various substances put within their reach, which affords us an opportunity of observing that the antennæ are certainly the organs of feeling. If a stranger queen appears, her entry is prevented by the bees on guard instantly laying

hold of her legs or wings with their teeth, and crowding so closely around her that she cannot move."

Worker-bees never sting a queen. Royalty hurls lance at royalty ; but the common folk desiring to dispense with a royal personage politely but fatally cluster about her so closely that she is smothered to death.

When young bees leave the hive for the first time it is said they fly close to it for awhile to get their bearings and learn the exact locality of their home, and that when hives are moved the bees upon flying forth note the spot to which they are to return.

When bees enter a new hive their first care is to build the combs, those marvellous structures that have given the bee such a high place in man's regard.

A full meal and quiet favor wax production and bees leaving their old home always go with full honey sacs, to provide food for a time in case of need, and we may suppose to aid in the production of wax for the new combs.

"When a swarm is placed in an empty hive," says Cheshire, "the bees climb the sides, and gradually and in close order advance along the roof, carefully securing themselves by the hooks (toes) of the fore-legs, in order to sustain the weight of lengthened chains of their comrades, formed by bee after bee hooking her fore-feet into the hind-feet of the one above. In this manner, the whole swarm will in an hour or so suspend itself in festoons, which are usually in part attached beneath to the neighborhood of the hive door, in order that an efficient guard may be kept up, and to give ready ladder-way should any arrive with supplies.

"This arrangement complete, all is hushed in perfect stillness, no bee of the living chain moves, whilst a high temperature is sustained ; and now the abundant food with which each emigrant charged herself before she left the old

home comes under the process of conversion, and the wax distils copiously on to the surface of the thin membrane in the pockets. . . .

"The wax having been secreted a single bee starts the first comb, by attaching to the roof little masses of the plastic material, into which her scales are converted by prolonged chewing with secretion; others follow her example, and the process of scooping and thinning commence, the parts removed being always added to the edge of the work, so that, in the darkness, and between the bees, grows downward that wonderful combination of lightness and strength, grace and utility, which has so long provoked the wonder and awakened the speculation of the philosopher, the naturalist and the mathematician."

When the comb is fairly started and the first urgent necessity — that of supplying cells for the eggs — is over, some of the bees hasten to the fields for honey and pollen, and only a portion concern themselves with further comb building.

It would seem that the production of wax is at least in part under the control of the bee, as in hives where artificial comb¹ is supplied the bees have been known not to secrete any wax, while on the other hand, during the height of the honey flow, in the hives where the bees build their own comb every worker bee in the colony seems to be supplied with wax scales, though these are not so abundant in the active bees as in those keeping still for the purpose, nor in the old foragers as in the young indoor bees.

Although it requires from ten to sixteen pounds of honey to produce one of wax, such is the amazing economy exercised in the use of this precious material that one

¹ "Artificial comb" explained later — it is made of bee's wax — only the form, not the substance being artificially made.

pound of it can store over thirty pounds of honey and it has been estimated that one pound of wax is moulded into from thirty-five to fifty thousand cells of worker comb.

The scales of wax as formed on the abdomen are very thin, brittle, and fragile, quite unfit for building purposes.

But after they have been thoroughly masticated and mixed with the saliva of the bee they become plastic and fit for use.

Bees give out much extra heat during the season of wax secretion, owing doubtless to the increased vital activity, and this high temperature is useful in keeping the wax plastic, as cold wax is more brittle and less easily moulded.

The bee first lays down the wax in a mass, as it were, and then with jaws and proboscis proceeds to hollow out and build up the cells; scraping and moulding, drawing out the edges of the little six-sided cups that grow under her labors, pressing out the waxen sides so thin that they become transparent and the wonder grows that they are not broken in the operation.

The natural form of a transverse section of the comb cell seems to be circular instead of hexagonal, as is shown by comparison with the cells of bumble-bees, and other species that have not acquired the skill of the hive-bee, and as is also shown by the cells about the edge of the hive-bee's comb, which are rounded when not in contact with anything. These rounded cells on the edges can be seen in the little square boxes of honey so commonly sold.

When hive-bees work, the cells they build are so placed as to interfere with those on all sides of them and thus are modified from the circular to the hexagonal form, the form that allows the greatest number of cells in a given space, with the least expenditure of wax.

They stand a certain distance apart according to the

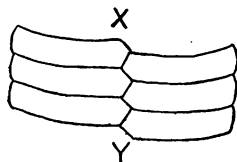
size of the cells they are building and with no apparent order or design create a fabric marvellous for order and design.

Each inner cell when finished is a six-sided hollow prism, open at one end and closed at the other. No cell stands alone ; excepting on the edges of the comb, each is surrounded by six others, and the walls of each are common to the adjoining cells.

The walls, although so thin, are water-tight, so that the enclosed nectar cannot pass from one cell to another.

The comb of the hive-bee is two cells deep, the cells standing end to end and opening on opposite sides of the sheet of comb, each cell thus being easily accessible.

In order that the honey may be the more readily retained the cells slant up a little and in addition are slightly curved. The partition *X-Y*, between the two sets of cells, is heavier than the side walls, and as the bottom of each cell is concave on the inside, the cells on opposite sides of the comb do not stand base to base, but the base of one



is so placed that the slanting walls of the bases of the opposite cells form its concavity. Thus upon looking down into an empty cell, the edges of three or sometimes four others are seen crossing back of its transparent base. Thus is greatly strengthened the bases which form the division wall between the two sets of cells.



Bees do not place themselves in orderly ranks and work away each at its own cell, but each bee as it were comprehends the design of a honey-comb in a cake of wax and each contributes its share of labor to the whole without any apparent regard to law and order.

"The finished comb is the result of the united efforts of the moving, restless mass," says Root, "and the great mystery is, that anything so wonderful can ever result at all, from such a mixed-up, skipping about way of working as they seem to have. . . .

"When the cells are built out only part way, they are filled with honey or eggs, and the length is increased when they feel disposed, or 'get around to it,' perhaps; as a thick rim is left around the upper edge of the cell, they have the material at hand, to lengthen it at any time. This thick rim is also very necessary to give the bees a secure foothold, for the sides of the cells are so thin, they would be very apt to break down with even the light weight of a bee. When honey is coming in rapidly, and the bees are crowded for room to store it, their eagerness is so plainly apparent, as they push the work along, that they fairly seem to quiver with excitement; but, for all that, they skip about from one cell to another in the same way, no one bee working in the same spot to exceed a minute or two, at the very outside. Very frequently, after one has bent a piece of wax a certain way, the next tips it in the opposite direction, and so on until completion; but after all have given it a twist or a pull, it is found in pretty nearly the right spot.

"As near as I can discover they moisten the thin ribbons of wax, with some sort of fluid or saliva. As the bee always preserves the thick rib or rim of the comb he is working, the looker-on would suppose he was making the walls of a considerable thickness, but if we drive him away, and break this rim, we will find that his mandibles have come so nearly together that the wax between them, beyond the rim, is almost as thin as a tissue paper."

Thousands of bees pour in and out of the hive many times a day, thousands more swarm over the combs, each,

untrammelled by rules, and with no set task, laboring at the general plan, storing a load in an empty cell, giving here and there a creating touch to the waxen fabric.

No bee works for itself, no bee takes pride in its individual well-built cell. The multitude works as though it were one bee, and the joy of each is in the perfection of the whole.

When the cells are finished and are nearly full of honey they are allowed to remain open for a few days that the extra water may evaporate and the honey be properly cured. They are then sealed or capped over with wax and the work is done.

Honey-comb cells are not mathematically regular in size or shape, as was formerly believed, but vary a great deal in different combs.

The old belief that honey-comb cells were perfectly uniform in size led some enterprising spirits to suggest them as convenient standards of measurement, but experiment showed such great diversity that they were forced to content themselves with the earth's meridian, which, though less convenient, is less variable.

Variation in size and shape of cells is universal; not only are the worker always smaller than the drone cells but those between the two are graduated from the smaller to the larger while the honey-comb cells often differ in size and shape. Often irregular cells are built in to fill an unoccupied space and queen cells show very great irregularity of form, size, and position, having been found on almost all parts of the comb, though as a rule they are built on the edges out of the way.

The queen cells have much thicker walls than the other cells and are built of odds and ends of wax, often chippings from an old comb, so that they are seldom clean and beautiful like the other cells.

The wonderful regularity of honey-comb is a beautiful tribute to the skill of the tiny workers, while its slight but universal irregularities show it to be the work of intelligence rather than of an unreasoning machine.

The length of the cells differs far more than the diameter. The depth of brood cells is quite uniform, for it would not do to take many liberties with the cradle of the bee, but the honey cells are sometimes built out until they are two or even three times the length of the brood cells, forming long curved galleries. Where the space between the combs is great the cells are very apt to be built out, making their surfaces irregular and the honey difficult to handle. Even in the boxes arranged for the bees to build in, in the modern hives, the honey-comb is sometimes built out beyond the wooden edge of the box, so that it cannot be transported safely.

Bees generally hang their combs parallel to each other, but they do not so generally hang the whole mass parallel to the side of their hive if left to their own devices. In fact they seem to prefer combs placed diagonally, and will even fasten one comb to another in such a way that it is impossible to remove the combs unbroken.

Bee-keepers take the liberty of interfering with comb-building in these days and by suspending frames in the hive compel the bees to build their combs parallel to the side of the hive and to each other. These frames often contain a sheet of wax known as "foundation," and this is frequently stamped by machinery to represent the bases of the cells. The bees accept this assistance in good part, and falling upon the sheet of wax draw it out into cells, without attempting to change its position. Even a small piece of foundation hung in a frame will often serve to start them in a given direction.

More than this, men having observed that bees eagerly

fill extra space with pure honey, when the brood is supplied, have placed extra compartments containing foundation or even empty combs above the brood hive, leaving an entrance into the upper part from the hive below — and in these “supers” the bees often store a phenomenal quantity of pure honey, which of course is claimed by man as a reward for his ingenuity, and which even from the bee’s point of view one should think might belong fairly to man in return for his care of the colony.

The little boxes of honey bought in the stores are frames taken from these upper stories.

When comb is first built it is extremely beautiful, being white and transparent. But the bees use the same cells over and over, both for brood and provisions, so in time comb left in the hive becomes dark-colored and less attractive in appearance, in old bee trees being sometimes almost black.

The brood combs are built first and are generally hung on the side nearest the entrance to the hive while the extra stores are placed behind or above the brood.

Honey is a luxury coveted by many creatures willing to steal into the hive and appropriate it, so it is placed as far out of reach as possible.

The brood is placed in the centre of the comb and close about it is stored the mixture of pollen and honey known as “bee-bread” which the nurses feed to the young.

The bee-bread, like the honey, is gathered from the flowers by the older bees or “foragers,” whose work outside the hive is very different from that within, and consists in carrying home stores of honey, pollen, “propolis” and water.

A bee gathering pollen is very different in action from one gathering honey, as she rushes wildly over the flower heads, “kicking up a dust” in a very literal sense. She

gathers this flower dust on the hairs of her body and then stands and combs it out with her numerous combs and brushes, deftly and quickly moistening it with honey when necessary to knead it together, and passes it from leg to leg until she has finally combed and scraped and rolled and patted it into her pollen baskets. Then home she hies. But we must let John Burroughs tell the rest.

"When a bee brings pollen into the hive, he advances to the cell in which it is to be deposited and kicks it off as one might his overalls or rubber boots, making one foot help the other; then he walks off without ever looking behind him; another bee, one of the indoor hands, comes along and rams it down with his head and packs it into the cell as the dairy-maid packs butter into a firkin."

If the bee has likewise a load of honey to deposit, she stands over another cell — one devoted to honey — and into this disgorges her precious drop of nectar.

The bee's first care in the spring is to get fresh pollen. This it seems to need more than honey and the polleny willow catkins are alive with the eager provisioners. The willow gives honey too, and whoever will take the trouble to explore a willow catkin with a magnifying glass will be rewarded by a view of the pearly drop in each tiny flowerlet.

Sometimes the bee-keeper helps out the pollen pantry in the early spring by giving his bees a supply of — rye flour or oatmeal! They are usually willing to substitute it for pollen, though it is difficult to understand how it can compare with it in nutrient value.

We of to-day know very little about bee-bread, as it never is sold in the markets. But a generation ago people were as familiar with the flavor of bee-bread as of honey. In the old-fashioned box hives where the bees did everything for themselves, and all in one large room, he who "robbed" the bees found bee-bread and honey oftentimes in all the

combs, and the brood comb scattered about with the rest. Bee-bread and honey were spread together on the slices of bread for the children's delectation, and if the flavor of the bee-bread was somewhat against the delicacy of the feast the enjoyment of the children was not sensibly lessened thereby.

To-day bees sometimes store bee-bread in the sections designed by the bee-keeper for pure honey, or they may even put brood in them, but where this happens the sections are not sold and the public is none the wiser.

Bees are thirsty souls and will fly long distances for water if it is not obtainable near home. They take it to the hive, probably to help in preparing food for the young.

The writer recalls a glass tank of water plants standing on the piazza of a Florida house where bees were always to be seen in crowds, sitting on the floating leaves, clinging to the stalks of the papyrus and edging the rim of the little aquarium.

The most troublesome cargo the bee carries is a sort of glue or resin called propolis with which it insists upon daubing over the whole inside of the hive.

This sticky stuff is quite as troublesome to the bee-keeper as to the bee. The keeper takes pains to have the hives tight and clean, the bee takes pains to daub everything over with propolis, spoiling the appearance of the pretty white boxes provided for the honey-comb and fastening everything tight and fast so that when the keeper attempts to remove a section of honey ten to one he finds it carefully glued fast to everything it touches, unless he is on the watch to take it before the bee gets around to the gluing act.

Bees mix propolis with wax to strengthen the cells, chink up every crevice and cranny, and if they are allowed will oftentimes carefully varnish over the whole surface of

the newly capped comb, spoiling its looks and ruining its sale.

In old, loose-jointed hives and in tree-trunks the propolis is necessary to stop up holes and make the hive warm and snug for the winter, but in the well-made modern hive it is a decided nuisance, excepting in cases of defence.

When a hive is attacked by robber-bees or more particularly by moths, the colony will often defend itself by barricades built of propolis before the entrance, making this so small that a moth cannot enter.

It was from this use of the substance that it received its name of "propolis," meaning "before the city."

When bees build defences of propolis to prevent robber bees from entering, they contract the hive entrance so that but one bee can pass at a time, when the guards can take care of the robbers.

Bees have been known to cover glass hives with propolis — doubtless to expel the light — thus rendering them useless for purposes of observation.

The bees get propolis from the covering of varnish on the buds of some trees, but they are not particular, eagerly collecting their troublesome glue from pitch, resin, varnish or any similar substance they can find.

Darwin tells us in the "Origin of Species": "Andrew Knight observed that his bees, instead of laboriously collecting propolis, used a cement of wax and turpentine, with which he had covered decorticated trees."

Propolis is greenish-yellow, and glistening in appearance when first gathered, but soon changes to a dark brown.

It has a strong balsamic odor and is gathered and carried on the thighs like pollen.

Propolis was formerly valued in medicine, and in some countries is still used, men going about and cleaning it from the hives.

Pliny says, —

“Propolis has the property of extracting stings and all foreign bodies from the flesh, dispersing tumors, ripening indurations, allaying pains of the sinews, and cicatrizing ulcers of the most obstinate nature.”

Keeping the hive clean is not one of the least arduous labors of the bee, yet it is done with scrupulous nicety, as Aristotle says, —

“If any bees die in the hive, they carry them out; and in other respects the bee is a very clean creature. For this reason they also eject their excrement when in flight, for the smell is bad. . . .

“It has been already observed that they dislike bad smells and the scent of unguents and that they sting persons who use such things.”

Bees were believed by the ancients to have a particular dislike to the smell of cooking crabs and the bee-masters are advised to keep far from them the “crabs reddening in the fire,” for as Pliny says, “The smell of crabs if they happen to be cooked in their vicinity is fatal to them.”

Where bees cannot remove obstructions in the hive they often cover them over with propolis, and there is a story of a venturesome mouse that entering a hive for honey was stung to death. Having slain their foe the bees found the corpse too large to move, and to protect themselves from the effects of its decomposition encased it in a tomb of propolis.

It is also related that a snail having crawled into one of M. Réaumeur's hives and retired into its shell at the approach of the foe was firmly glued to the hive floor. Even to the slow comprehension of a snail the situation must have been amazing, not to say agonizing, when it found its house had become its sepulchre.

The queen and drones, feeding largely upon a concentrated food, have little excretion and that of an inoffensive nature, so although they do not, like the workers, leave the hive, their presence there is unobjectionable.

This and the habits of the workers account for the marvellous cleanliness of everything in the hive, and for the exquisite purity of the honeycomb. During the winter the bees are almost dormant, eating comparatively little, the workers being able to retain the residue of their food until they can take their spring flight.

According to the ancient writers when bees flew abroad on windy days they carried a little stone in their feet for ballast. But modern bees do not do this, and probably the ballast of the bees of the ancients was a misconception on the part of the observers.

Bees were also said to lie on their backs to keep their wings dry when belated and obliged to lie abroad all night, but this too is foreign to the habits of modern bees.

Bees hatched early in the season when there is much honey to gather often wear themselves out by excessive labor in six weeks or even less time, while if they would but take life easily they might linger for several months, nine months probably being the maximum period of a worker's life.

During a great honey flow one colony of bees has been known to store *seven hundred pounds* of surplus honey in one season. This is very unusual, though it is not unusual for them to store a hundred pounds. A hundred pounds of cured honey means fifty gallons of nectar brought drop by drop from the flowers to the hive. No wonder such a task wears out the bees. In the frenzy of their desire to get all there is they sometimes work by moonlight when the lindens are in bloom or other easily obtainable nectar is flowing in abundance. There is nothing in a bee's mind

so unpardonable as the wasting of nectar ; it prefers unceasing work and an early death.

Much floundering about in flowers and flying against the wind tear and disfigure the wings so that an old field-bee is sometimes a sorry-looking sight.

Moffett says of these : —

“ Oftentimes being over-wearied, they faint in their return to their own private cottages, not being able to attain them. And because some of them in regard of their roughness are unfit to labour, by rubbing their bodies against stones and other hard matter they are smoothed, afterwards addressing themselves most stoutly to their business.”

This whimsical remedy for old age is matched by their reputed manner of performing their toilet.

“ When they have refreshed themselves with flying about, then they bath and wash themselves clean, and afterwards they lightly rub themselves smooth with leaves.”

The queens live several years, but the drones like the workers have a brief span of life, which, short as it is by nature, by art is made yet shorter.

Although bees are intolerant of disease and helplessness they are not unkind to those upon whom misfortune has fallen, and a bee with a full honey-sac is always ready to feed a hungry sister.

It is amusing to watch the bees on a window pane feed each other, particularly when new arrivals are introduced to those already in confinement.

As soon as they recognize each other as from the same hive the bee fresh from the fields is invited to share her spoils and she stands with raised head, open jaws, and presumably open mouth while her hungry sister inserts her long tongue and sucks the honey disgorged on her account.

Sometimes the begging bee is a little too exacting or per-

chance the supply falls short, when, if the feeding bee is teased too long she loses her temper, or is it a sense of humor that causes her suddenly to close her jaws upon the importunate and sensitive tongue of her sister?

Whatever the cause that prompts the action there is no doubt of the effect. The bitten bee winces and jumps back, doubtless feeling inexpressible things, and begs no more for honey.

Bees are quick to fly to the rescue and avenge the wrong of a sister bee when she is being hurt and cries for help. Every bee-keeper knows how much more likely he is to get stung if he inadvertently crushes any of the bees during his manipulations.

Although the worker bees are undeveloped females and as a rule are unable to produce eggs, yet if a hive loses its queen and is unable to replace her a very curious thing happens.

Some of the better developed of the worker bees acquire power to lay eggs!

The origin of these "fertile workers" as they are called is uncertain. They may exist when there is a queen and then be destroyed by the bees, or the longing for young — for combs filled with eggs and young bees — their particular care and the hope of their race — may affect the physical life of the bee so that it is possible for it to perform maternal functions.

As it is impossible for a worker bee to mate because of her imperfect structure, all of her eggs are unfertilized and of course hatch into drones.

The fertile workers are therefore a greater misfortune even than the loss of the queen since the swarm of drones that comes forth hastens the destruction of the colony by quickly consuming the stores.

The old method of obtaining the honey was to smoke

the bees to death with brimstone, — a custom which has justly merited the censure of all fair-minded people.

Langstroth warmly exclaims: "Killing bees for their honey was, unquestionably, the invention of the dark ages, when the human family had lost — in apiarian pursuits, as well as in other things — the skill of former ages. In the times of Aristotle, Varro, Columella, and Pliny, such a barbarous practice did not exist. The old cultivators took only what their bees could spare, killing no colonies, except such as were feeble or diseased.

"The modern methods have again done away with these customs among enlightened men, and the time has come when the following epitaph, taken from a German work, might properly be placed over every pit of brimstoned bees: —

' Here rests,
cut off from useful labor,
A colony of
Industrious Bees
basely murdered
by its
ungrateful and ignorant
Owner.' "

Thorley inveighs against the brimstoning of bees: "With the utmost Cruelty, Injustice, and inexcusable Ingratitude, destroying them, if not with Fire and Sword, yet with Fire and Sulphur, by Thousands and Ten Thousands, without the least Remorse.

"Thus at once to despoil them of their Riches, and sacrifice their dear Lives, must be barbarous indeed; and to famish them to Death, is far worse than simple Suffocation."

And again he says: —

"The common, but cruel method of taking Hives, at this Season of the year, is by burning with Fire and Brimstone, to which I can by no means be reconciled; and here in

this public Manner protest against, preferring to it Fumigation ; whereby with safety we may become Possessors of their Treasure."

Thomson has given us the following pathetic appeal against the destruction of bees by sulphur : —

" Ah ! see where robb'd and murder'd in that pit
Lies the still heaving hive ! at evening snatch'd,
Beneath the cloud of guilt concealing night,
And fix'd o'er sulphur. . . .
Sudden the dark oppressive steam ascends,
And us'd to milder scents, the tender race
By thousands tumble from their honey'd dome,
Convuls'd and agonising in the dust."

Butler wants a law made as unalterable as that of the Medes and Persians : —

"That they which feloniously break open these true labourers' houses, shall, like other house-breakers be deemed and judged as guilty of burglary, and so have no benefit or favour by the muses, that thus violate the Muses' sacred favorites."

Shakespeare, in " Henry IV.," refers to the killing of the bees when the king awakens, finds his crown gone, and inveighs against the prince thus, —

" For this the foolish over-careful fathers
Have broke their sleeps with thoughts,
Their brains with care, their bones with industry.
For this they have engrossed and pil'd up
The canker'd heaps of strange-achieved gold ;
For this they have been thoughtful to invest
Their sons with arts, and martial exercises :
When, like the bee, culling from every flower
The virtuous sweets,
Our thighs pack'd with wax, our mouths with honey,
We bring it to the hive ; and, like the bees,
Are murder'd for our pains."

Bee-hives are now so constructed that they can be opened and their contents removed or changed about, and examined without materially interfering with the actions of the bees that frequently continue their labors even when the comb is held in the hand of the bee-keeper. The chief excellence of the modern hive is in the movable frames, which are fitted with grooves, so that when the hive is opened, the frames containing the comb can easily be removed, the combs examined, changed in any way the bee-keeper pleases, and returned quickly. The movable frame hive, which has revolutionized bee-keeping, was invented in 1852 by Lorenzo Lorrain Langstroth, who is known as the "father of American apiculture."

Langstroth was born in Philadelphia in 1810, and from childhood was deeply interested in studying insect life. Later he devoted himself to the study of bees and to the development of the industry of apiculture, having done more than any one else in this country to give it the place it now holds here. He is the author of "The Honey Bee," one of the most interesting and best practical books on bee-keeping.

One of the great improvements in modern bee-keeping is the use of smoke to calm the bees instead of killing them. In the up-to-date apiaries a little instrument for puffing smoke is used for this purpose ; and the astonished tenants of the hive find not only the roof mysteriously, suddenly, and silently removed from their habitation, but a stream of smoke pouring over their forms and stupefying them into stingless acquiescence in the depredations or changes made by some power from without.

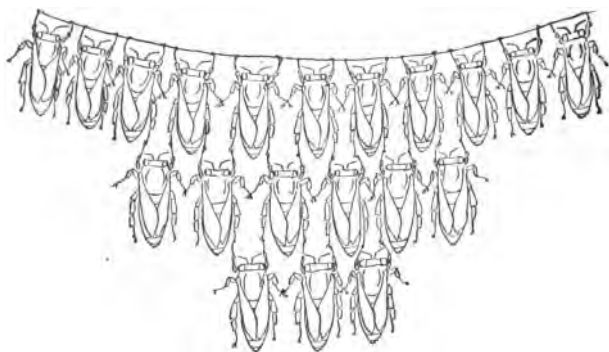
A slight smoking applied to the bees when the hive is opened, and before they have time to recover from their surprise enough to use their stings, enables the skilful bee-keeper to examine the combs, take them out and put them

in, handle the bees like flies, and, in short, do as he pleases without danger.

Some bee-keepers are able to handle their little subjects with no protection whatever ; with bare hands and face and without smoke they perform the necessary operations.

The bees continue working as if nothing unusual were happening ; those in the way of the operator often crawl harmlessly over his hands, taking all he does in good part, as though they understood that his efforts were directed to their ultimate good.

There is no doubt that bees become accustomed to the manipulations of their owner and soon learn to know him.



XI

THE SWARM

IN early summer when the season is favorable for the storing of honey, the bees prosper and their hive is soon "boiling over" with occupants.

The home is now too small for the multitude, and the queen-mother, hearing the piping of a young queen, instead of executing her, gives and bequeaths to her all of the brood comb, honey comb, unhatched young, indoor bees and present stores, and taking nothing with her but a great mass of her loyal subjects sallies forth to found a new house.

The foragers that happen to be abroad when the exodus takes place remain with the young queen and help her build up the fortunes of her family.

Sometimes a second swarm leaves soon after the first, with which goes the young queen, leaving a still younger one, or, it may be, one of the same age to attend to home affairs. When the colony is prosperous and swarming active, the bees do not allow the queens to kill each other.

Sometimes as many as three swarms are cast in one season from the same hive, and even more; indeed, we hear of as many as eleven having gone from a hive in Carolina. These new swarms each cast one or more, so that the astonished owner finished the season with twenty-two swarms, while a number more had escaped, as he had no hives in which to put them.

Swammerdam tells an equally remarkable story of a bee-keeper who had only one hive left after the Count de Mans-

veldt overran Embden. The bees did their best, however, to re-imburse him, becoming the parents and grandparents of thirty families within the following year.

When the swarm is preparing to depart there is an unwonted state of excitement expressed by a peculiar noise which Pliny thus comments upon : —

“The king never quits the hive excepting when the swarm is about to depart ; a thing which may be known a long time beforehand, as for days a peculiar buzzing noise is to be heard within, which denotes that the bees are waiting for a favorable day, and making all due preparations for their departure. On such occasions if care is taken to deprive the king of one of his wings, the swarm will not fly away.”

Where the bee-keeper does not wish the number of bees in a hive lessened by swarming he still prevents it by clipping the queen's wings, for it is as Pliny said, —

“When their leader is withheld from them the swarm can always be detained.”

“For they cannot possible live,” says Moffett, “without a king, against whom, none is so hardy as to lift up his finger to offer him any violence, much less to conspire his destruction, unless he (after the fashion of tyrants) do overthrow and turn all things upside down, after his own will and lust, or neglecting carelessly the Weal publique, setteth all upon six and seven. Yea, if he accustom himself to go often abroad, (which he cannot do without the great hurt and prejudice of his Citizens) they do not by and by kill him, but they take from him his wings, and if he then amend his life and look better to his office, they singularly affect and honor him.” A statement of the case which does more credit to the imagination than to the observation of those days.

As a rule bees do not sting when swarming, and Thorley

tells in a very melodramatic manner how a swarm of bees once settled upon the breast and neck of a young girl who was helping him hive them. She, being afraid, had placed a cloth over her head and shoulders, and it so happened that the queen-bee crawled under this cloth and was tempestuously followed by the whole swarm.

"It is not in my power," says Thorley, "to tell the Confusion and Distress of Mind I was in, from the awful Apprehensions it raised; and her Dread and Terror in such Circumstances may reasonably be supposed to be much more. Every moment she was at the Point of retiring with all the Bees about her. Vain Thought! To escape by Flight. She might have left the Place indeed, but could not the Company; and the Remedy would have been much worse than the Disease. Had she enraged them, all Resistance had been in Vain, and nothing less than her Life would have atoned for the Offence. And now to have had that Life (in so much Jeopardy) insured, what would I not have given?"

Her life was saved, however, by Thorley's finding and removing the queen, when the swarm left their unwilling hostess to follow their rightful sovereign. The girl's reward was to become a local heroine and lose forever all fear of bees!

Butler describes the coming forth of the queen from the hive at the time of swarming with a pen more worthy of a novelist than of a naturalist. He tells us that when two thirds or three fourths of the swarm have departed, "the music ceaseth and then cometh forth this stately dame: who, walking a turn or two before the door (of purpose, you would think, to be seen) she takes her leave; leaving but a small train to follow her, which hie them after as fast as they can.

"This decent order, the great lords of the earth seem to

have learned of this little lady : who, in their courtly progress, going to Parliament, and other solemn processions, do send the greatest and fairest part of their retinue before them, leaving behind but a small troupe of necessary attendants, to guard their persons."

The well-known habits of pounding on kettles and reflecting light upon a swarm may not really cause it to settle in these days, but Virgil's advice to throw a little dust upon them is good, though a more certain measure is to cause a smart shower from the garden hose to strike them, when down they come in a hurry, wondering, no doubt, what kind of storm this is that bursts out of a clear sky with no "signs" to warn them of its approach. They do not generally swarm excepting in fair weather, and it may be that when dust is thrown they mistake it for some eccentric sort of storm.

Pounding on kettles, however, has its advocates still, and there are those who contend that a loud noise prevents the note of the queen from being heard, and disconcerts the swarm to the point of causing it to settle.

The excitement of swarming is great enough to increase the heat several degrees, Huber having discovered the temperature of a populous hive on a fine spring day to be from 90° to 97° , while at the swarming time it rises to 104° .

Burroughs gives us a fascinating description of the swarming of bees : —

"I always feel that I have missed some good fortune if I am away from home when my bees swarm. What a delightful summer sound it is ! how they come pouring out of their hives, twenty or thirty thousand bees each striving to get out first : it is as when the dam gives way and lets the waters loose ; it is a flood of bees which breaks upward into the air and becomes a maze of whirling black lines to

the eye and a soft chorus of myriad musical sounds to the ear.

"This way and that they drift, now contracting, now expanding, rising, sinking, growing thick about some branch or bush, then dispersing and massing at some other point, till finally they begin to alight in earnest, when in a few moments the whole swarm is collected upon the branch, forming a bunch perhaps as large as a two-gallon measure."

All the pleasures of the chase may be experienced in pursuing a swarm of runaway bees; and whether the game is bagged or not, the hunter's hands are clean of useless slaughter, and his blood set in as active motion as though the quarry had run on four legs.

Burroughs tells us of such an experience. The issuing swarm had been properly hived, —

"But something offended them, or else the tree in the woods — perhaps some royal old maple or birch holding its head high above all others, with snug, spacious, irregular chambers and galleries — had too many attractions; for they were presently discovered filling the air over the garden and whirling excitedly around. Gradually they began to drift over the street; a moment more, and they had become separated from the other bees, and, drawing together in a more compact mass or cloud, away they went, a humming, flying vortex of bees, the queen in the centre, and the swarm revolving around her as a pivot, — over meadows, across creeks and swamps, straight for the heart of the mountain, about a mile distant, — slow at first, so that the youth who gave chase kept up with them, but increasing their speed till only a fox-hound could have kept them in sight. I saw their pursuer laboring up the side of the mountain, saw his white shirt-sleeves gleam as he entered the woods; but he returned a few hours afterward without any clew as to the particular

tree in which they had taken refuge out of the ten thousand that covered the side of the mountain."

There came forth one hot July noontime another of Mr. Burroughs's swarms that proceeded to make off.

"The house was situated on a steep hillside. Behind it, the ground rose for a hundred rods or so, at an angle of nearly forty-five degrees, and the prospect of having to chase them up this hill, if chase them we should, promised a good trial of wind at least; for it soon became evident that their course lay in this direction. Determined to have a hand, or rather a foot, in the chase, I threw off my coat and hurried on, before the swarm was yet fairly organized and under way.

"The route soon led me into a field of standing rye, every spear of which held its head above my own. Plunging recklessly forward, my course marked to those watching from below by the agitated and wriggling grain, I emerged from the miniature forest just in time to see the runaways disappearing over the top of the hill, some fifty rods in advance of me. Lining them as well as I could, I soon reached the hill-top, my breath utterly gone and the perspiration streaming from every pore of my skin. On the other side the country opened deep and wide. A large valley swept around to the north, heavily wooded at its head and on its sides. It became evident at once that the bees had made good their escape, and that whether they had stopped on one side of the valley or the other, or had indeed cleared the opposite mountain and gone into some unknown forest beyond, was entirely problematical. I turned back, therefore, thinking of the honey-laden tree that some of these forests would hold before the falling of the leaf."

One more engaging story Burroughs must tell us of runaway bees:—

"I heard of a youth in the neighborhood more lucky than myself on a like occasion. It seems that he had got well in advance of the swarm, whose route lay over a hill, as in my case, and as he neared the summit, hat in hand, the bees had just come up and were all about him. Presently he noticed them hovering about his straw hat and alighting on his arm; and in almost as brief a time as it takes to relate it, the whole swarm had followed the queen into his hat. Being near a stone wall, he coolly deposited his prize upon it, quickly disengaged himself from the accommodating bees, and returned for a hive. The explanation of this singular circumstance no doubt is, that the queen, unused to such long and heavy flights, was obliged to alight from very exhaustion. It is not very unusual for swarms to be thus found in remote fields, collected upon a bush or branch of a tree."

Who among us but can sympathize with Mr. Burroughs when he exclaims:—

"I love to see a swarm go off—if it is not mine; and if mine must go, I want to be on hand to see the fun."

The first hive-bees brought to America had the New World all to themselves for a long time.

There were no rivals in the vast flowery plains but the wild bees that eat but do not store up honey and the "burly dozing humble-bee," that both eats and saves, albeit in small quantities, the joyous nectar of the blossoms.

The honey-bee under these favorable circumstances prospered and increased amazingly until the forests of the United States were well supplied with "bee-trees," to the delectation alike of the Red Man and the bear, both of whom were quick to appreciate the value of the remarkable sweet supplied by the "white man's fly."

The fondness of the bear for honey has been noted from early times, and many amusing stories have been told of its

efforts to appropriate the contents of the bee-trees, the following being credited to Demetrius, a Muscovite ambassador at Rome : —

“ A man searching in the woods for honey slipped down into a great hollow tree, where he found himself up to his breast in a lake of honey.

“ He stuck fast there two days, making the lonely woods resound in vain with his cries for help. Finally, when he had abandoned hope, a large bear appeared upon the scene, bent upon the same business that had taken the man there. Bruin smelled the honey, that had been stirred up by the struggles of the prisoner, and straightway climbed the tree and let himself down backward into the hollow. The man, whose wits had been sharpened by adversity, caught him about the loins and made as vigorous an outcry as he could. Up clambered Bruin in a panic, not knowing what thing had hold of him. The man clung fast, and the bear tugged, until by main force he had pulled himself and his captor out of the tree ; then the man let go and Bruin took to the woods with all speed, leaving his smeared companion to his own congratulations.”

The lake of honey into which the man fell recalls the stories one reads of lakes of honey sometimes found in India. Where the heat is excessive, the combs melt, and no doubt it sometimes happens that combs built in hollow trees are unable to bear the tropic sun at its fiercest and melt down, when the honey flows from the tree to the ground beneath.

In the Hindu “Harsa-Carita” we read in a description of the hot season of its “raining beeswax in the woods from the bee-hives full of melting honey, as if they were covered with sweat.”

And again we are told of a sacred grove, parched and waterless in the hot season, that it was “all astir with the

swarms of bees flying out of the masses of honey-comb as they were licked by the monkeys and bears."

Muir pays his tribute to California Bruin's fondness for honey, thus : —

" Bears, too, roam the sweet wilderness, their blunt, shaggy forms harmonizing well with the trees and tangled bushes, and with the bees, also, notwithstanding the disparity in size. They are fond of all good things, and enjoy them to the utmost, with but little troublesome discrimination, — flowers and leaves as well as berries, and the bees themselves as well as their honey. Though the California bears have as yet had but little experience with honey-bees, they often succeed in reaching their bountiful stores, and it seems doubtful whether bees themselves enjoy honey with so great a relish. By means of their powerful teeth and claws they can gnaw and tear open almost any hive conveniently accessible. Most honey-bees, however, in search of a home are wise enough to make choice of a hollow in a living tree, a considerable distance above the ground, when such places are to be had ; then they are pretty secure, for though the smaller black and brown bears climb well, they are unable to break into strong hives while compelled to exert themselves to keep from falling, and at the same time to endure the stings of the fighting bees without having their paws free to rub them off. But woe to the black bumble-bees discovered in their mossy nests in the ground ! With a few strokes of their huge paws the bears uncover the entire establishment, and before time is given for a general buzz, bees old and young, larvæ, honey, stings, nest, and all are taken in one ravishing mouthful."

According to the ancients the bear's object in despoiling bee-hives was not wholly epicurean. Pliny explains that when bears come forth from their winter sleep, still dull and torpid, —

"Their eyesight is dull, for which reason in especial, they seek the combs of bees, in order that, from the bees stinging them in the throat and drawing blood, the oppression in the head may be relieved."

In Poland and other parts of Russia the bear's fondness for honey is taken advantage of by the wily hunters, who, knowing Bruin's weakness, set bear-traps before the bee-trees.

Not only bears and Indians but white men as well rejoice in the discovery of a bee-tree and undertake almost any labor to get the honey from it. Burroughs, in his "Idyl of the Honey-Bee," takes us on many interesting and successful hunts for bee-trees.

The hunter "lines" the bees by catching some and putting them into a box containing honey. As soon as the bee has filled itself with honey he allows it to fly, when it rises up in the air to get its bearings and makes a "bee-line" for home.

As soon as he is sure of the direction taken by the bees, he moves the box and again watches their flight. The bee-tree will be found at the point of intersection of the two lines. This method of lining bees sounds extremely easy on paper; it is not so easy in the forest, however, as anybody can discover by trying, though an experienced bee-hunter often becomes remarkably skilful in quickly locating the bee-trees.

Bees have many enemies, as is but natural to those possessing a treasure desired by so many other creatures. Bears eat bees, honey and all, but they are not the only four-legged honey thieves, as Reynard in some places has a very bad reputation. Huish in his book upon bees says of him: —

"These rascals of foxes eat the bees as well as the honey, but it is the honey to which they are the most partial. For

two years a particular fox came every winter to overthrow my hives. I put a chicken and some bread to amuse him, and some poison to kill him; but, no, the cunning thief would not touch either; he went directly to the hives. Mark the sagacity of the animal; he would not come in summer, when the bees were in full vigor, as he knew in what manner he would be received; but he steals slyly to the hives when the inhabitants are in a state of torpor, and thus obtains their treasure without incurring any danger himself."

Pigs have been known to overturn hives for the sake of their contents.

Some species of badger are very fond of honey, and Menzel tells of one that bites the trees containing wild honey out of rage because he cannot clamber up to it, and by the traces of these bites the inhabitants discover the bee-trees.

In South America is found the honey-bear, or kinkajou, about as large as a cat, very strong and active, and a great destroyer of wild bees, for the sake of getting their honey. It lives in trees and has a long tongue, which helps it to appropriate the stolen sweets.

There is an East Indian bear, the sloth-bear, or aswail, so fond of honey that it is named mellursus, or the honey-bear.

The mouse in some places is a great nuisance to bee-keepers, making its nest in the roof of straw hives, whence it is able to sally forth and regale itself at its pleasure.

Some birds have an appetite for bees, which has led to their banishment by the bee-keeper.

Among these the tomtit, or titmouse, has a very bad reputation, being accused by no less an authority than Buffon of scratching and tapping at the hives to induce the sentinel bees to come forth, when one after the other they are caught and swallowed.

But the bee-eating feats of the titmouse, who is satisfied with ten or a dozen honeyed morsels for breakfast, pale before the superior power of the American king-bird, or bee-martin, from the crew of one of which was once taken a hundred and seventy-one bees! They had been swallowed so quickly that many were still alive; and when they were laid upon a blanket in the sun, "fifty-four of them returned to life, licked themselves clean, and joyfully went back to their hives."

The woodpecker is said to insert its tongue into any seductive crack in the hive and draw forth the honey, though it is not accused of taking the bees as well.

The bird known as the "bee-eater" bears its guilt in its name, while from the time of Aristotle the swallow has borne the reproach of being a bee-eater; and an old Greek poet was moved to make it the following well-known address, —

"Attic maiden, honey-fed,
Chirping warbler, bear'st away
Thou the busy buzzing bee,
To thy callow brood a prey?
Warbler, thou a warbler seize?
Winged, one with lovely wings?
Guest thyself, by summer brought,
Yellow guest whom summer brings
Wilt not quickly let it drop?
'T is not fair, indeed, 't is wrong,
That the ceaseless warbler should
Die by mouth of ceaseless song."

In the East Indies and Southern Africa dwells a clever little bird that, greatly desiring honey or young bees, yet fearing to be stung, points out the bee-tree to the hunters, receiving as reward a part of the spoil.

Toads, frogs, and tree-frogs are not averse to a meal of bees, and Aristotle accuses the toad of great duplicity in

accomplishing its evil design, "for it blows into the entrance of the hive, and watches for and destroys them as they fly out!"

This is more than can be claimed for modern toads, though they do sometimes stand near the hives for the purpose of appropriating stragglers.

There are different opinions concerning the effect of bee stings upon toads, some saying they do them no harm. But an eye-witness relates the following tragic circumstance. A toad sitting in the sun suddenly cocked its eye at a bee that alighted near it. After a second's hesitation it shot forth its tongue and the bee disappeared, but not to die inglorious and unavenged, for presently the toad raised a protesting hand and rubbed its throat which at once began to swell in an amazing manner. The toad exhibited signs of the greatest distress and finally leaped up and fell over on its back dead, — a very much bloated and disfigured amphibian.

This particular toad may have been uncommonly sensitive to bee-poison, or the bee may have inserted its sting directly into a blood-vessel. But whatever the cause there is no question as to the result.

Huish brings in a verdict of guilty against the toad by relating that he once killed one under a hive and found nineteen undigested bees in its stomach, while some one else convicted a graceless batrachian of having swallowed twenty.

Columella advises constructing the hive so as to "guard against the deceit and craft of the lizard, who, like a watch or keeper of the entry, and gaping for his prey, with open mouth destroys the bees as they go out."

From the time of Aristotle wasps have been known as the enemies of bees, and Thorley says of the hornet, —

"She flies about the Colonies of Hives, watching her

Opportunity, then seizes a bee, and carries her away, as the Hawk does the little Bird."

Sad to relate, bees often fight with their neighbors and steal their honey, and they have been known to drain the nest of the bumble-bee of its stores. Yea, they even catch the home-coming bombus and torment her, four or five of them pulling her wings and biting her until she opens her mouth and yields up the very drop she is carrying. It is said the bumble-bees do not resist these onslaughts from their smaller and more intelligent neighbors.

Hive-bees do resent the intrusion of robbers from other hives, however, and there sometimes occur terrific battles on this account. This was known to the ancients, and according to Pliny, —

"If food happens to fail the inhabitants of any particular hive, the swarm makes a concerted attack upon a neighboring one, with the view of plundering it. The swarm that is thus attacked at once ranges itself in battle array, and if the bee-keeper should happen to be present, that side which perceives itself favored by him will refrain from attacking him. They often fight, too, for other reasons as well, and the two generals are to be seen drawing up their ranks in battle-array against their opponents. The dispute generally arises in culling from the flowers, when each, the moment that it is in danger, summons its companions to its aid. The battle, however, is immediately put an end to by throwing dust among them, or raising a smoke."

Bee-keepers in this age cannot rely upon immunity from attack by the swarm they desire to favor, nor are modern bees led in battle by their "generals" nor any governing power excepting their own insatiable desire to sting whatever living thing they can get hold of.

Fights between swarms are terrible affairs in which one would do well not to interfere without careful preparation.

Thorley was "a witness of fatal Battles, of More than two Days' Continuance, occasioned by a strange swarm forcing their way into a single Hive or Colony."

"Shirach very gravely recommends it to apiarists whose hives are attacked by these depredators, to give the bees some honey mixed with brandy or wine, to increase and inflame their courage, that they may more resolutely defend their property against their piratical assailants."

Spiders are sometimes a nuisance to bee-keepers, but the worst insect enemy of the bee is undoubtedly the moth.

In Europe the death's head moth enters the hives and causes havoc. Huber tells at length of a war waged by his bees against this moth by building barricades of propolis the years the moth were abundant, and tearing them down those seasons when the enemy failed to appear.

The most destructive of all moths, however, is the so-called wax-moth. These little nuisances, of which there are two kinds, one half an inch, the other an inch long, flutter about the hives at dusk seeking an opportunity to enter, and if they succeed in doing so they deposit their eggs in crevices of the hive. As soon as the eggs hatch, the naked caterpillar-like larvæ begin to feast on wax, breaking down the combs and causing general destruction. The little rascals spin a web about themselves which they cover on the outside with their own excretions and bits of wax, making a safe gallery in which to hide their tender bodies, and which they enlarge to suit their needs. They put forth their horny heads, devour wax, and grow apace. They are the only creatures, so far as we know, that are able to digest wax, but they find it quite suitable to their development, supplementing it by bee-bread and the cast-off skins of the larval bees. When these enemies get entrance to a hive they in time reduce its contents to a

cobwebby mass of most disagreeable and dirty appearance, totally destroying the swarm of bees.

Seen with an unprejudiced eye, the wax-moth is a pretty, silky-gray little creature that darts about with amazing swiftness, but probably no bee-keeper has ever looked at it dispassionately, as it is one of the worst pests he has to contend with.

The list of those that relish honey and take it at the expense of the bee would not be complete without adding that according to report the native Mexicans were once fond of taking their honey along with the bee, eating eggs and larvæ, and that to this day the Hottentots do the same.

In the "Curious History of Insects" we read the following : —

"Bees have also been employed as an article of food. Knox tells us that the natives of Ceylon, when they meet with a swarm of bees hanging on a tree, hold burning torches under them to make them drop ; and so catch and carry them home where they boil and eat them, in their estimation, as excellent food."

Again, —

"Peter Martyr, speaking of the Caribbean Islands, says : 'The inhabitants willingly eat the young bees, rawe, roasted, or sodden.'"

And, —

"Bancroft tells us that when the negroes of Guiana are stung by bees, they in revenge eat as many as they can catch."

In White's "Natural History of Selborne" we read of an idiot boy whose only intelligence was shown in skill in bee-catching. He would catch the bees in his fingers and eat them for the honey in their sacs. He would overturn hives for the sake of honey, and like the tomtit would rap at the entrance and catch the sentinels when they came forth.

He would linger about the place where metheglin was being made, and beg for it, calling it "bee-wine." He ran about, making a humming noise like the buzzing of bees with his lips, and was utterly stupid in everything excepting the getting of honey.

In the opinion of Thorley, —

"The last and worst Enemies of all are their most ingrateful, unjust, cruel, and merciless Owners, who annually destroy them by wholesale without the least Pity or Compassion. A practise I absolutely disapprove and publicly condemn."

Bees, like other creatures, are subject to disease, a fact thus commented upon by Pliny : —

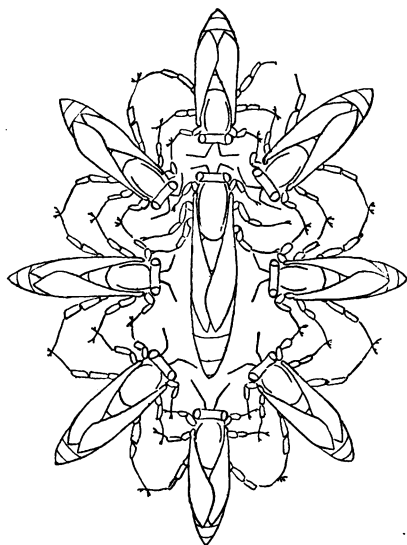
"Bees are also by nature liable to certain diseases of their own. The sign that they are diseased is a kind of torpid, moping sadness ; on such occasions, they are to be seen bringing out those that are sick before the hives, and placing them in the warm sun, while others, again, are providing them with food. Those that are dead they carry away from the hive, and attend the bodies, paying their last duties, as it were, in funeral procession.

"If the king should happen to be carried off by the pestilence, the swarm remains plunged in grief and listless inactivity ; it collects no more food, and ceases to issue forth from its abode ; the only thing that it does is to gather around the body, and to emit a melancholy humming noise. Upon such occasions, the usual plan is to disperse the swarm and take away the body ; for otherwise they would continue listlessly gazing upon it, and so prolong their grief. Indeed, if due care is not taken to come to their aid, they will die of hunger. It is from their cheerfulness, in fact, and their bright and sleek appearance that we usually form an estimate as to their health."

This fancy sketch of their maladies does not truly repre-

sent the bees of to-day, that suffer severely from certain diseases, but are not, so far as we know, consumed by grief over the death of their comrades, nor do they take care of them when sick.

It is a well-known fact that bees, like most other insects, have parasites. In warm countries the "bee-louse" often proves troublesome, sometimes even covering the queen-bee until only her legs are visible.



XII

HONEY

EVERY pleasant summer day the bees are up and away at daybreak in search of nectar.

"Humming-moths and humming-birds seldom set foot upon a flower, but poise on the wing in front of it, and reach forward as if they were sucking through straws. But bees, though as dainty as they, hug their favorite flowers with profound cordiality, and push their blunt, polleny faces against them, like babies on their mother's bosom. And fondly, too, with eternal love, does Mother Nature clasp her small bee-babies, and suckle them, multitudes at once, on her warm Shasta breast." Thus Muir. And he might have said it of every flowery knoll this fair land over.

In May the apple blossoms are rifled and their sweets gathered into the hives, to be fed mostly to the young.

In June the red raspberries in the north tempt the bees from all other blooms and afford such abundant nectar that they begin to fill the upper stories with pure honey by which we are to benefit.

But the honey of the first flowers belongs to the bees, and that from the maple, the willow, the alder, and the dandelion we are not as a rule allowed to taste. Our turn comes when the raspberries and white clover begin to bloom.

Then is laid by great store of surplus sweets. As fast as a flower is drained of its nectar by the eager bees, its glands pour out more, so as long as a plant remains in bloom it yields as a rule tribute to the honey-seekers.

This elaboration of nectar takes place in some flowers with amazing rapidity, so that if the blossoms are protected from the approach of insects, in a few hours they will look as if they had been dipped in honey.

There is a very beautiful plant, *Cleome Integrifolia*, growing wild in the west, and known as the Rocky Mountain Bee Plant, which yields an extraordinary quantity of honey, and a near relative of this, commonly known as the Spider Plant, a native of South America, is not only one of the most beautiful of garden flowers, but one of the most remarkable of honey-producers.

The lovely pink flower clusters with their airy petals and long and slender filaments yield five gallons of nectar to the acre daily, and continue to bloom freely for three months. So vigorous is the life of these plants that the nectary can easily be seen filling up after it has been licked out by a bee, and the nectar is often elaborated in such abundance that it streams out on the ground.

However, it is not necessary to go so far afield for plants yielding large store of nectar, as the flowers in our gardens, the nasturtiums, the honey-suckles, and many others, produce an amount that is readily observable, and all know of the drop hidden at the bottom of each floret of clover.

Both red and white clover yield a surprising amount of honey of superior delicacy, and one bee-keeper reports having obtained sixty-six pounds of clover honey in three days from one hive.

Linden or lime-tree nectar is poured forth in such inviting abundance that during the period of bloom the trees resound like enormous bee-hives, for every bee within flying distance is on hand to fill its little "bottle," as Butler calls its honey-sac, and even on moonlight nights the trees have been known to breathe forth the hum of industry.

The viper's bugloss, or "blue thistle," which is not a

thistle at all, but belongs to the Borage Family, often yields two hundred pounds to a colony, of a honey as clear and delicate as that of white clover.

It is stated that sweet clover, the dried leaves of which our grandmothers put in their linen closets, yields from four to five hundred pounds of honey to the acre. Who would imagine, looking over a waste of sweet clover, any such possible harvest? Of course this burden of sweets does not weigh down the clover all at once, the flowers continually renewing the supply as it is removed.

The small sour-wood tree that grows so abundantly over the mountains of the Carolinas and in other sections of the country yields a rich harvest to the bee, as one bee-keeper experienced when he obtained twelve hundred pounds of sour-wood honey in one season from his apiary. This honey is dark in color but agreeable in flavor, and the tree is one of the prettiest ornaments of the summer forest with its sprays of white blossoms. Its name is derived from the acid taste of its leaves.

The large cup-shaped green-and-yellow blossoms of the tulip-tree secrete so much nectar that it can sometimes be dipped out with a spoon, and bees will readily fill their hives with tulip-tree honey alone in the course of a few days. The tree itself is one of the handsomest of forest trees and well worth a place on the lawn. Its light green leaves as they unfold in the early spring on the southern mountains form one of the chief beauties of the landscape.

The homely but interesting teasel, formerly cultivated for the purpose of carding woollen cloth by means of its spiny heads, affords both honey and water to the bee, the water being collected in cups formed by the bases of the leaves at every joint of the stem and containing from a spoonful to half a pint.

Some kinds of honey are much more highly esteemed

than others. Linden honey, for instance, has been famous from antiquity, and is still esteemed wherever found, Lithuania in Russia being particularly noted for its lime-tree honey. When first gathered it is somewhat crude and with a slight turpentine taste, that disappears as the honey mellows with age.

White clover honey, gathered by the bees in preference to almost any other, is by many considered the most perfect of all honey.

Sweet clover honey has a more decided but very delicious flavor, and is the main honey-yielding plant in some sections of the country.

Each part of the country has its own honey, and while in the northern States white clover, linden, and buckwheat afford the principal supply, farther south a great store comes from the viper's bugloss, which was brought to this country from Europe and formerly cultivated in gardens, but is now a weed over large areas in the South, its beautiful blue flower-clusters yielding a clear, colorless, and delicate honey.

Yet farther south the bees gather tribute from the cotton fields, storing tons of clear honey in pure white combs, — fit food for the houris, as thinks the Sultan of Turkey, who has cotton honey supplied to his seraglio.

Yet farther south the orange blossoms yield a delectable and abundant sweet, while the mangroves and palmettoes are not far behind in excellence.

The best honey in Persia, Florida, and the Island of Malta, though these countries are widely separated, comes from the orange blossoms, which yield a valued honey wherever they bloom.

In the far West the white sage competes with the thyme of Mount Hymettus in the excellence of its honey, although honey from all members of the Sage Family is somewhat

strong, and like linden honey is improved by standing uncovered for awhile.

Pliny says : —

“The honey of Attica is generally looked upon as the best in the world ; for which reason it is that the thyme of that country has been transplanted.”

In western New York, where catnip is grown in large fields, the honey retains a slight but evident flavor which tells its origin even when purchased half across the continent.

Each kind of flower gives its characteristic flavor to the honey, though the strong-flavored honeys are generally mellowed by time, the cruder principles probably escaping in volatile oils.

In Wales, where leeks and onions are raised in large quantities for seed, and thus allowed to blossom, the honey partakes of the flavor, not to its advantage ; and every one knows the strong flavor of the buckwheat honey, a prime favorite with some, and concerning which Burroughs speaks most appreciatively.

“It is a homely old stanza current among bee folk that —

‘ A swarm of bees in May
Is worth a load of hay ;
A swarm of bees in June
Is worth a silver spoon ;
But a swarm in July
Is not worth a fly.’

“A swarm in May is indeed a treasure : it is like an April baby, sure to thrive, and will very likely itself send out a swarm a month or two later ; but a swarm in July is not to be despised ; it will store no clover or linden honey for the ‘ grand seignior and the ladies of his seraglio,’ but plenty of the rank and wholesome poor man’s nectar, the sun-tanned product of the plebeian buckwheat. Buckwheat

honey is the black sheep in this white flock; but there is spirit and character in it. It lays hold of the taste in no equivocal manner, especially when at a winter breakfast it meets its fellow, the russet buckwheat cake. Bread with honey to cover it from the same stalk is double good fortune. It is not black, either, but nut-brown, and belongs to the same class of goods as Herrick's

'Nut-brown mirth and russet wit.'

How the bees love it! and they bring the delicious odor of the blooming plant to the hive with them, so that in the moist, warm twilight the apiary is redolent with the perfume of buckwheat."

In France the rosemary of Narbonne has made the honey of that region famous; but we learn that this, like the honey of Hymettus, is living principally upon its past reputation, for the peasants have turned their attention to the vineyards to the neglect of the bees, so that the supply of rosemary honey from Narbonne is yearly diminishing.

Languedoc also supplies rosemary honey of high renown, while the balm of Pontus has given that honey a name.

"A species of broom (*Spartium nubigerum*), growing abundantly in the Canary Islands, renders the Peak of Teneriffe productive of a very pure and transparent honey, of a delicious aromatic taste, and superior to that of Hymettus," says Bevan.

Nearly all fragrant and bright flowers yield nectar, fragrance, and color, being the plant's invitation to its insect guests to come and feast, and in return convey pollen to it from other plants of the same species, and bear away its pollen to cross-fertilize its neighbors.

Many plants are so modified in form that self-fertilization is impossible, they being dependent upon the pollen brought by visiting insects.

Some flowers ripen the stamens first, so that when the pollen is ripe the pistil is not sufficiently mature to receive it, and when the pistil is ready the pollen is withered or has been removed. Others again ripen the pistil first. Still others have pistils and stamens so placed with relation to each other that the pollen cannot reach the pistil. Some flowers possess only stamens, the pistils being found in other blossoms that have no stamens. Many wonderful and beautiful forms of flowers have developed to insure cross-fertilization by certain insects, an interesting subject which has been greatly developed and much written about in recent years. The task of carrying pollen does not rest wholly with the discretion of the bees, but is obligatory upon them, sometimes indeed proving a very disagreeable necessity, as in those orchids where the pollen masses smear the bees in what must be quite a disagreeable manner, and in the common milkweed, where the pollen is drawn forth in little sticky bundles from the anthers when the bee's body touches them. These sticky masses of milkweed pollen sometimes cling to the feet of the bees and tangle them up so that the little creatures become helpless and perish through the over-zeal of the milkweed.

It was doubtless the attachment of these pollen masses to the heads of the bees that Butler refers to as marks of office : —

“ Besides their sovereign, the bees have also subordinate governors and leaders, not unfitly resembling captains and coronels of soldiers. For, different from the rest, they bear for their crest a tuft or tossel, in some colored yellow, in some murrey, in manner of a plume ; whereof some turn downward like an Ostric-feather, others stand upright like a Hern-top. And of both sorts some are greater and some less, as if there were degrees of those dignities among them. In all other respects they are like to the vulgar.”

The value of bees to the production of various fruits and vegetables is inestimable, as the horticulturist of to-day well knows ; and the wise farmer has a row of bee-hives not far from the orchard, that he may win, not only a store of delectable sweets, but also a sure crop from his fruit trees. It has been frequently demonstrated that orchards which year after year failed to bear, upon the introduction of bee-hives at once yielded a good crop. Unless the flowers are well fertilized no fruit will set ; or if it does the apples or pears will be small and imperfect.

The members of the Gourd Family, to which belong the melons, pumpkins, and cucumbers, are not self-fertilizing ; consequently, when cucumbers are raised in green-houses for the winter market the gardener himself is obliged to convey the pollen from the staminate flowers to the pistils of the pistillate, or else press into service the bees. This he sometimes does, and certain large cucumber-houses are now supplied with bee-hives.

Every one knows the story of the attempt to introduce red clover into Australia and New Zealand. The clover flourished admirably when first sown, but would set no seed. For some mysterious reason clover fields in these countries were a failure.

The secret of the relation between the bumble-bee and the clover became known to the colonists, and a few nests of bumble-bees being introduced into the sterile fields settled the difficulty, thenceforth bumble-bees and clover assisting each other to the fulfilment of their destiny.

The amount of nectar yielded by flowers is surprising, but the amount of honey collected by bees depends not only upon the abundance of nectar obtainable but upon the condition of the hive.

•In the old-fashioned box-hive, where the bees were smoked to death, thirty or forty pounds of mixed honey-

comb, brood-comb, bee-bread and dead bees were considered a good yield for one season, while the following is quoted as being extraordinary even in the best constructed hives at the time it occurred, —

“Mr. Wildman states that in the year 1789 he purchased a glass filled with exceedingly fine honey-combs weighing sixty-three pounds, which had collected within a month, and that the hive which it had surmounted still contained a full supply for the winter’s consumption of the bees. This, however, was a very unusual product; an ordinary hive or box may be considered well stocked when it yields from thirty to thirty-five pounds of honey.”

There is a different story to tell to-day when the bees are cared for with scientific knowledge; provided with hives that seem to put them on their honor to fill the prepared chambers with honey; encouraged to devote their time and strength wholly to honey-gathering by being given empty combs to fill, or wax foundation to build quickly into new combs; and supplied with abundance of nectar-flowing flowers. No wonder they are stimulated to feats of honey-making that would have taxed the credulity of Mr. Wildman with his sixty-three pounds of surplus honey.

That amount is now the average in a prosperous apiary and even in the northern part of the United States a hundred pounds of pure surplus honey is not uncommon and two and three hundred pounds is sometimes obtained.

In Texas one hive is reported as having yielded the amazing amount of seven hundred pounds of honey in one season from the horse-mint, that grows there in abundance.

Seven hundred pounds of honey means over three hundred and fifty gallons of nectar brought drop by drop in the little “bottles” of the bees from the horse-mint to the hive.

It is owing to the invention of the ingenious instrument known as the honey-extractor that a colony of bees is at present able to store such vast amounts of honey. By use of this instrument the combs can be emptied without being broken and can be restored to the hive, for the bees to fill again. Nothing appeals to a bee's love of work like an empty comb, and the little creatures will continue to fill them as long as they can get a drop of honey to carry home.

Langstroth thus explains the origin of the honey-extractor, —

"In 1865 the late Major de Hruschka, of Dolo, near Venice, Italy, invented 'Il Smelatore,' THE HONEY-EXTRACTOR.

"It happened in this wise: He had given to his son a small piece of comb-honey, on a plate. The boy put the plate in his basket, and swung the basket around him, like a sling. Hruschka noticed that some honey had been drained out by the motion, and concluded that combs could be emptied by centrifugal force."

To-day the caps are cut from the cells of honey-comb by a broad thin knife and the comb placed in an "extractor," where it is rapidly revolved until the cells are empty. It is then returned to the bees that quickly repair any slight damage it may have received, and proceed to refill it.

Since wax is wholly indigestible and since honey freed from the comb in this way is pure and as good as when in the comb, extracted honey is deservedly acquiring popularity, though there still lingers the very justifiable prejudice against "strained honey" which prevents extracted honey from coming as quickly as it deserves into general use in families, most people not yet understanding the difference between the two.

Strained honey was obtained by pressing the combs, or by melting them, when the wax was taken from the top and the honey from below. Great carelessness in handling this honey and no care as to what kind of combs were pressed or melted resulted in a dark-colored liquid containing all sorts of disagreeable impurities, so it is no wonder there lingers a feeling of distaste for honey that has been removed from the combs.

Doubtless extracted honey is sometimes adulterated by dealers with cheap syrups and it is interesting to know that the adulteration of honey is an ancient as well as a modern fraud, for Pliny tells us that the must of grapes was boiled down to the consistency of honey and used for its adulteration.

To-day the cheap and harmful glucose or corn-syrup supplants the must of grapes as an adulterant, just enough honey being added to flavor the compound.

The color of the comb and of the honey depends doubtless upon the flowers from which the nectar is gathered, and from a note in the Koran we learn that, —

“The Arabs are curious in and fond of honey. Mecca alone affords eight or nine varieties, green, white, red and brown.”

Menzel tells us that in Russia, whose steppes afford the bees rich nourishment, is found honey of all colors, white, yellow, brown, yes *black*, sold in the cleanest vessels.

He also tells us that in Siberia there are white bees whose honey is also white; that from the Isle of Bourbon and the Isle of France there comes a green honey that is very valuable; that a green honey in red wax cells is found in Africa; that in Madagascar is a very thin but brown honey made by little black stingless bees; and in Brazil are black bees whose wax is also black.

The comb of the *Apis Mellifica*, our hive-bee, is often

very white and delicate when first made, though sometimes it is yellow and delicate, depending upon the kind of flowers the honey eaten by the bees to produce wax was gathered from. But as time goes on it becomes dark colored, particularly where brood and honey are alternately placed in the same cells, and old combs are sometimes found which are almost black which is probably the explanation of Pliny's great German comb eight feet long and black on the convex side. The honey in an old beehive is much of it darker and stronger than that in one newly occupied.

The nectar of some flowers is poisonous to man and particularly in the tropics one should taste wild honey with caution.

Serious results have sometimes followed the eating of poisonous honey, as in the well-known case of Xenophon's army during the Retreat of the Ten Thousand.

The young general led his forlorn hope back from Asia to Greece, overcoming all obstacles of difficult travel and hostile people, but just before reaching Trebizond on the Euxine Sea his army met a terrible defeat which came not from the hostile men along his route but in a curious way from the bees. Xenophon's forces had put the inhabitants to flight and had quartered themselves in numerous villages where were obtainable abundant supplies and among them a delicacy that was like to have cost Xenophon dear, but we will listen to the story as he himself tells it in the "Anabasis": —

"Here, generally speaking, there was nothing to excite their wonderment, but the numbers of bee-hives were indeed astonishing, and so were certain properties of the honey.

"The effect upon the soldiers who tasted the combs was, that they all went for the nonce quite off their heads, and

suffered from vomiting and diarrhoea, with a total inability to stand steady on their legs. A small dose produced a condition not unlike violent drunkenness, a large one an attack very like a fit of madness, and some dropped down, apparently at death's door. So they lay, hundreds of them, as if there had been a great defeat, a prey to the cruellest despondency. But the next day, none had died; and almost at the same hour of the day at which they had eaten they recovered their senses, and on the third or fourth day got on their legs again like convalescents after a severe course of medical treatment."

Strabo tells a still more harrowing tale of the honey of Pontus. After describing the mountains and speaking of the savage Heptacometae who inhabited them he continues:

"All the inhabitants of these mountains are quite savage, but the Heptacometae are more so than all the others. The Heptacometae cut off three of Pompey's cohorts, as they were passing through the mountains, by placing on their road vessels filled with maddening honey, which is procured from the branches of trees. The men who had tasted the honey and lost their senses were attacked and easily despatched."¹

Pliny has a good deal to say of poisonous honey:—

"Indeed, the food of bees is of the very greatest importance as it is owing to this that we meet with poisonous honey even. At Heraclita in Pontus the honey is extremely pernicious in certain years, though it is the same bees that make it at other times. *Ægalethron* (goat's death) proves fatal to beasts of burden and particularly to goats, and its blossoms steeped in the rains of a wet spring contract most noxious properties."

The beautiful rhododendron flowers that are abundant

¹ Not all of the honey of Pontus was poisonous, however, as that made from the balm held a very high place.

in Pontus are accused of being this "goat's death," the source of the poisonous honey.

Pliny speaks too of maddening honey : —

"In the country of the Sanni, in the same part of Pontus, there is another kind of honey, which causes madness and is called 'mænomenon.' It is attributed to the flowers of the rhododendron with which the woods there abound. Although the people pay a tribute to the Romans in wax they derive no profits whatever from the honey in consequence of these dangerous properties.

"In Persis, too, and in Sætulia, a district of Mauritania Cæsariensis, bordering on the country of the Massæsyli, there are poison honeycombs found ; and some too only partly so, one of the most insidious things that possibly could happen were it not that the livid color of the honey gives timely notice of its noxious qualities. What can we suppose to have possibly been the intention of Nature in thus laying these traps in our way, giving us honey that is poisonous in some years and good in others, poisonous in some parts of the combs and not in others, and that, too, the produce in all cases of the self-same bees?

"It was not enough, forsooth, to have produced a substance in which poison might be administered without the slightest difficulty, but must she herself administer it as well in the honey, to fall in the way of so many animated beings? What in fact can have been her motive except to render mankind a little more cautious and somewhat less greedy?"

Pliny also describes a honey, to be coveted by the housewives of to-day, though it possessed but the one good quality.

"Upon Mount Carma in the Island of Crete, which is nine miles in circuit, there is not a fly to be found and honey made there no fly will touch. By this circumstance

honey coming from there is usually tested ; it is highly prized for medical preparations."

The rhododendrons and the laurels, that make the northern woods and the southern mountains of North America so gorgeous in the spring and summer, are still as poisonous as are members of the same family in Asia Minor ; though the bees here do not, as a rule, work upon these questionable sweets. That upon occasion they may do so however the following goes to prove : —

"Dr. Barton, in the American Philosophical Transactions, says that in the autumn and winter of 1790, the honey collected near Philadelphia proved fatal to many, in consequence of which a minute inquiry was instituted under the direction of the American Government, and it was ascertained satisfactorily that the fatal honey had been chiefly extracted from the flowers of the *Kalmia latifolia*. Still more recently, two persons at New York are said to have lost their lives by eating wild honey, which was supposed to have been gathered from the flowers of the dwarf laurel, a thriving shrub in the American woods."

The same authority speaks of death having ensued from eating the common American pheasant which had fed on the leaves of the *Kalmia latifolia*, showing the extremely pernicious quality of this beautiful shrub.

Again we are told : —

"A party of young men, induced by the prospect of gain, having removed their hives from Pennsylvania to the Jerseys, whose vast savannas were finely painted with the flowers of the *Kalmia angustifolia*, could not use or dispose of their honey, on account of its intoxicating quality ; yet 'the bees increased prodigiously,' an increase only to be explained by their being well and harmlessly fed."

Some plants, however, are poisonous to the bees themselves as the following curious story illustrates ; —

"A large swarm of bees having settled on a branch of the poison-ash (*Rhus Vernix* L.) in the county of West Chester in the province of New York, was put into a hive and removed to the place where it was to remain. Next morning the bees were found dead, swelled to double their natural size, and black, except a few which appeared torpid and feeble, and soon died on exposure to the air."

And Pliny warns us, —

"The greatest care should be taken to keep the cornel at a distance from the hive; for if the bees once taste the blossoms of it, they will speedily die."

This certainly is not true of the cornel, the *Cornus florida* or flowering dogwood of North America. This beautiful little tree that whitens the forests in spring, and whose flowers have an odor of honey, yields a large quantity of harmless nectar to the seeking bees.

Dead bees have been found in tulip flowers and also strewing the shelves and floor of greenhouses where the cineraria was in bloom.

The honey of the yew and also of box — sometimes called hemlock — has a bitter flavor which renders it unpalatable to man, the bitter Corsican honey being frequently referred to by the old writers, and thus by Ovid:

"I think it's Corsick honey, and the Bee
From the cold Hemlock flowers gathered thee."

There are stories of poisonous honey having been found in most parts of the world, though the laurels and rhododendrons bear the worst name in this respect north of tropical climes.

The plants that yield poisonous honey in the United States are *Kalmia angustifolia*, the little red-flowered sheep-laurel or-lambkill of our northern pastures; *Kalmia latifolia*, the splendid mountain laurel that makes the woods of

Eastern North America such a scene of beauty in the early summer ; *Kalmia hirsuta* ; *Rhododendron maximum*, one of the most glorious of blooming plants ; *Azalea nudiflora*, the lovely purple azalea or pinxter flower that makes the mountains of the Carolinas so charming in the spring-time ; and *Andromeda mariana* or stagger-bush whose foliage is poisonous to lambs and calves. On the other hand the pretty little *Andromeda nitida* bears honey-scented flowers that yield a nectar abundant, delicate and wholesome.

It is interesting to note that all of the above-mentioned poisonous plants belong to the Heath Family that gives us our blueberries, huckleberries, cranberries, wintergreens, and snowberries ; and to which belongs the heather, whose honey is so abundant, and so highly prized that the bees of Scotland are carried to the Highlands for the purpose of gathering it.

The Heath Family offers us esteemed fruits with one hand, the juices of which are never poisonous ; and with the other gives us the most wonderful blooms of the American forests, — blooms that convert the mountain-sides into amazing flower-gardens, but whose beauty is for the eye alone.

The beautiful and fragrant yellow jessamine that turns the southern swamps and waysides to gold in the springtime has also the reputation of yielding poisonous honey.

With such wealth of poisonous bloom it is remarkable that the honey of this country is ever fit to eat ; yet, as a matter of fact there are very few instances of harm having resulted from eating it. The bees prefer the harvest found in wholesome plants, that also bloom in abundance.

Pliny gives us signs by which poisonous honey can be detected ; but as a matter of fact it is very seldom that color or flavor betray the danger.

Sometimes honey from poisonous flowers proves injurious to the young bees, and sometimes bees gather honey from other sources than flowers — if opportunity affords — as all know who have watched the primitive sap-boiling in Florida, where the cane is crushed in a wooden mill in the open air, and where the barrel into which the sap runs contains not only cane juice but a crust of honey bees that having come to gorge remain to die, drowned in the too abundant sweet.

Nor do bees disdain the allurements of the cider-mill, though cider when stored in honey-comb is said to prove fatal to the young. And one grieves to learn that bees may, upon occasion, become sad inebriates.

“It has been a gross libel upon animals to say that a man has made a beast of himself, when he has drunk to such excess as to lose his reason; but we might without injustice say that he has made a bumble-bee of himself, for those little debauchees are particularly prone to intoxication. Round the nectaries of hollyhocks, you may generally observe a set of determined toppers, quaffing as pertinaciously as if they belonged to Wilkes's club; and round about the flower (to follow up the simile) several of the bon vivants will be found lying on the ground inebriated and insensible.” Thus quotes Bevan, and immediately adds, “I have frequently seen the ground beneath one of my pear-trees strewed over with hive-bees and wasps, in a similar state, after they had banqueted upon the rich juices of the fallen fruit.”

Sometimes plants yield nectar from other organs than the glands of flowers, some of the vetches, for instance, having dark spots on their leaves from which a sweet liquid exudes, and other plants having nectar-yielding glands on leaves or stems.

The source of honey was as puzzling to the ancients as

was the source of the offspring of the bees ; and while they believed them to gather the latter from flowers, they were convinced the honey came not from flowers but from the sky above.

Aristotle says, "Honey falls from the air, principally about the rising of the stars, and when the rainbow rests upon the earth. Generally no honey is produced before the rising of the Pleiades."

Pliny, too, goes into very interesting details upon the subject.

"This substance," he says, "is engendered from the air, mostly at the rising of the constellations, and more especially when Sirius is shining ; never, however, before the rising of the Vergiliæ, and then just before daybreak.

"Hence it is, that at early dawn the leaves of the trees are found covered with a kind of honey-like dew, and those who go into the open air at an early hour in the morning find their clothes covered, and their hair matted, with a sort of unctuous liquid. Whether it is that this liquid is the sweat of the heavens, or whether a saliva emanating from the stars, or a juice exuding from the air while purifying itself, would that it had been, when it comes to us, pure, limpid, and genuine, as it was when first it took its downward descent. But as it is, falling from so vast a height, attracting corruption in its passage, and tainted by the exhalations of the earth as it meets them ; sucked, too, as it is, from off the trees and the herbage of the fields and accumulated in the stomachs of the bees, — for they cast it up again through the mouth ; deteriorated besides by the juices of flowers, and then steeped within the hives and subjected to such repeated changes, — still, in spite of all this, it affords us, by its flavor, a most exquisite pleasure, the result, no doubt, of its ethereal nature and origin."

According to the Eddas, honey-dew was a distillation

of the sacred tree Ygdrasil, and in the "Elder Edda" we read, —

"The great and sacred ash is besprinkled with a white water, whence comes the dew which falls into the valleys, and which spring from the fountain of Past-time." We are further informed that men call this the honey-dew, and that it is the food of bees.

That honey is gathered chiefly from flowers a later generation knew, still the belief in honey-dew from heaven lingered on, and we find Butler in 1634 thus explaining it, —

"But the greatest plenty of purest nectar cometh from above: which Almighty God doth miraculously distil out of the air; and hath ordained the oak, among all the trees of the wood, to receive and keep the same upon his smooth and solid leaves; until either the bee's tongue or the sun's heat have drawn it away. When there is a honey-dew, you may perceive by the bees: for (as if they smelled it by the sweetness of the air) they presently issue out of their hives, in great haste following one another; and refusing their old haunts, search and seek after the oak; which for that time shall have more of their custom than all the plants of the earth. Sometimes the maple and hazel take part with the oak, but little and seldom. While the honey-dew lasteth, they are exceedingly earnest, plying their business like men in harvest; you may see them so thick at the hive door, passing to and fro, that oftentimes they throw down one another for haste. What this *mel Roscidum* should be, Pliny seemeth much to doubt. But, if conjectures might be admitted, I would rather judge it to be the very quintessence of all the sweetness of the earth (which at that time is most plentiful) drawn up, as other dews, in vapours into the lowest region of the air, by the exceeding and continual heat of the sun; and there concrete and condensated by the nightly cold into this most sweet and sovereign nectar,

which thence doth descend into the earth in a dew or small drizzling rain.

"The hotter and drier the summer is, the greater and more frequent are the honey-dews: cold and wet weather is unkind for them; much rain at any time, as coming from a higher region, wasteth away that which is already elevated; (so that there can be no more until another fit of hot and dry weather) and in the end it dissolveth them quite."

In White's "Natural History of Selborne" we read the following:—

"June 4, 1783. Fast honey-dews this week. The reason of these seems to be, that in hot days the effluvia of flowers are drawn up by a brisk evaporation, and then in the night fall down with the dews with which they are entangled."

Thorley expresses the same idea,—

"It is the most generally received and prevailing Opinion that the Honey-Dews consist of Vapours raised in the third Region, and being thoroughly purged and digested by the Heat of the Sun, and condensed, fall down to the Earth."

What this strange honey-dew might be was long a mystery. There is no doubt that a sweet substance often covers the leaves of plants at certain seasons of the year, principally in July and August. We still find the honey-dew, — often in disagreeable abundance, — and there are still those who look upon it as a precipitation of flower vapors that have been drawn into the upper air.

Those who have been let into the secret of honey-dew, however, no longer consider it in any sense a distillation of the skies.

Moreover, although Zeus' oaks still yield honey to the seeking bees, we know the sweet liquid is not a gift from

any god. That poetical notion has vanished before the critical eye of science, which has discovered two natural causes for the appearance of the honey-dew.

One is that under certain conditions certain plants express a sweet sap from their leaves. This may not be "vegetable perspiration which trees emit for their relief in sultry weather," but it is sometimes as copious as a profuse perspiration and in some instances at least appears to be the result of abnormal conditions.

The other source of honey-dew one hesitates to exploit, for while one is willing to accept honey from the "bottle" of a bee, it is another matter to receive it graciously from a plant-louse. For no doubt the greater part of the honey-dew found in such clammy abundance on our tulip and oak trees, even on our apple-trees, on our elm, maple, plane, lime, and cherry-trees, on our hazel, blackberry, and currant bushes, in fact, upon occasion almost anywhere, comes from the little insects known as aphides, — the ants' cows, as they are sometimes called.

These gourmands attach themselves to the under side of the leaf by the proboscis, and there stay and suck out the juices of the plant, taking the nourishment they need and manufacturing at the same time an excrementitious substance of a sweet taste.

This honey-dew the ants are very fond of, some species even cultivating the aphides for the sake of having it. The story obtained currency that the ant caressed the aphid with its feelers, when the accommodating "cow" gave forth a drop of the sweet liquid from two little "horns" on its back. To-day we are deprived of even the small comfort of these "horns," which are shown to excrete, not the sweet honey-dew, but a waxy substance by which to smear the faces and so repel the attacks of insect enemies. The honey-dew then is purely excrementitious, and is elaborated in such

abundance that it is often thrown some distance in the form of a fine spray. When a tree is covered with aphides this honey-dew may frequently be seen raining down in a fine drizzle, which falls upon the upper surface of the leaves below, even on the ground and surrounding foliage, covering everything with a sticky substance that collects the dust and soon turns black, making the trees affected and everything near them extremely disagreeable to touch or to look at. There are many varieties of aphides, — some almost transparent, light green, and delicate-looking, others dark brown or reddish in hue.

The bees are undoubtedly fond of this honey-dew and collect it in large quantities. Some writers speak of it as disagreeable in flavor and dark in color, while others speak well of it, the difference probably depending upon the species of aphids from which the honey was gathered.

Bevan says, "During the time of a honey-dew more honey will be collected in one week than will be afforded by flowers in several," and recommends giving the bees extra room in which to store this abundant harvest.

That it is not everywhere considered disagreeable is proven by the following couplet from Coleridge's "Kubla Khan": —

"He on honey-dew hath fed,
And drunk the milk of Paradise."

The English country people deem it a deposit of the east winds, and speak of it as John Honey-dew.

Honey was formerly used instead of sugar to preserve fruits, and Butler has collected for us a number of the old recipes, as appetizing to read as are most of the recipes of Athenæus.

He tells us that, "Marmalade is thus made: First boil your quinces in their skins till they be soft; then having pared and strained them, mix therein the like

quantity of clarified honey ; and boil this together till it be so thick that in stirring (for you must continually stir it for fear of burning) you may see the bottom ; or, being cooled on a trencher, it be thick enough to slice ; then take it up and box it speedily. You may also add a quantity of almonds and nut-kernels : also cinnamon, ginger, cloves, and mace, of each a like quantity, pounded small, and put into the honey with the quinces, and in boiling to be stirred together. This is very good to comfort and strengthen the stomach. For want of quinces you may take wardens, pears, or apples, and specially the pearmain, gilliflower, pippin, and roiall."

One would not at all object to "comfort and strengthen the stomach" in this wise.

"Marchpane may be made after this manner. Boil and clarify, by itself, so much honey as you think meet ; when it is cold, take to every pound of honey the white of an egg, and beat them together in a basin till they be incorporate together, and wax white : and when you have boiled it again two or three walms upon a fire of coals, continually stirring it, then put to it such quantity of blanched almonds or nut-kernels stamped as shall make it of a just consistence ; and after a walm or two more, when it is well mixed, pour it upon a table, and make up your marchpane. Afterwards you may ice it with rose-water and sugar. This is good for the consumption."

Consumption in those days had its compensation.

"Preserve fruits after this manner.

"The damascens, or other fruit, being gathered fresh from the tree, fair, and in their prime (neither green or sour, or over-ripe or sweet) with their stalks, but cut short ; weigh them, and take their weight in raw fine honey : and putting to the honey the like quantity of fair water, boil it from half quarter of an hour, or till it will yield no scum ; then

having slit the damascens in the dented side (for fear of breaking) boil them in this liquor with a soft fire, continually skimming and turning them, till the meat cometh clean from the stone; and then take them up. If the liquor be then too thin, boil it more; if in the boiling it be too thick, put in more fair water, or rose water, if you like it. The liquor being of a fit consistence, lay up and preserve therein your fruits.

"If they be greater fruits, as quinces, pipins, or the like; then shall it be expedient (when you have bored them through the middle, or have otherwise cored them) to put them in as soon as the liquor is first skimmed: and then to let them boil till they be as tender as Qadlings."

"Conserves of roses is thus to be made: Take of the juice of fresh red roses one ounce, of fine honey clarified ten ounces: boil this together; when it beginneth to boil, add of the leaves of fresh red roses (clipt with scissors in little pieces) four ounces: boil them to the consumption of the juice, and presently put up the conserves into some earthen vessel. Keep it long therein; for in time it waxeth better and better.

"After the same manner is made conserves of violets.

"Syrup of roses make thus: Steep fresh roses in hot water over the embers (the vessel being covered) until the roses wax pale: then strain out the roses, and put fresh in their places, until they also are pale: this do ten times, or until the water be red. And this being purged with whites of eggs (to every pint of liquor one) boil it gently with like quantity of fine honey, until it be of convenient thickness. If you prepare it for present uses, the less boiling will serve: if you mean to keep it, it requireth more; for which purpose the sunning of it is good. This purgeth a little, specially being new."

Or thus: "Steep one pound of red rose leaves in four

pound of water, four and twenty hours. When the water is strained, put into it two pound of fine honey, and boil it to the thickness of a syrup, taking off the skum as it riseth. It tempereth the hot affections of the brain, it quencheth thirst, it strengtheneth the stomach, it procureth sleep, and stayeth thin rheums.

"The syrup of violets is made (after the same manner) of fragrant violets, and steeped until the liquor be blue. Being well boiled, it may be kept a year without sinnewing or corruption. It tempereth and purgeth hot and sharp humors; and therefore is good in a pleurisy: it expelleth melancholy, and the effects thereof, as headache, waking, dreaming, and heaviness of heart; it is fit to be used before and after purging.

"If any man like better to make these confections with sugar, let him take the like quantity as of honey: for sugar also hath, with his sweetness, a power to preserve; as being a kind of honey. But in respect of the marvellous efficacy which fine and pure honey hath in preserving health, that gross and earthy stuff is no whit comparable to this celestial nectar. Although some quaint and lady-like palates (whom nothing but that which is far sought and dear bought can please) unhappily neglect it. In preserving fruits it hath more power through the viscosity thereof. Also conserves and syrups, being made with honey, continue longer, and do more kindly work their effects. So that we may conclude with Ecclesiasticus, cap. ii. 3: 'The bee is little among such as fly: but her fruit is the chief of sweet things.'"

"Sweetmeats," juncates, or honey-meats from all time have been favorite luxuries, and in earlier days were made principally of honey compounded with "meats," such as flour, cheese, and even meat itself, the Bedas of Ceylon to this day, it is said, eating honey with their meat.

To-day confectionery is made principally of sugar, and fruits are generally preserved in it instead of in honey, the "quaint and lady-like palates" of the present day preferring sugar as being more delicate in flavor and making a less rich conserve, — moreover, it is cheaper.

Yet honey is not wholly discarded in the manufacture of "sweetmeats;" as witness the famous "honey cakes of Nuremberg," and as well the honey cakes sold at the French fairs, concerning which Langstroth says, —

"In France, 'pain-d'épice,' 'ginger-bread,' is sold in immense quantities at the fairs. The best makes are sold at the most important fairs throughout the country. It keeps an indefinite length of time, and farmers' wives are wont to buy enough to last for months. The following is the recipe: —

"Dissolve four ounces of soda in a glass of warm skimmed milk. Take four pounds of flour and pour in the milk and enough warm honey to make a thick dough, flavor with anise and coriander seeds, cloves, and cinnamon, all powdered fine; knead carefully, as you would bread. Let it rise two hours in a warm place, spread in pans and bake in a moderately warm oven. Ten or twelve minutes will do, if the cakes are thin. As soon as the cake resists to the touch of the finger, it is done. Before baking, it may be decorated with almonds, preserved lemon peel, etc. Wheat flour makes good 'pain-d'épice,' but some prefer rye flour. Fall honey is preferable for it, on account of its strong taste."

We are told that the gems and jumbles of the following two recipes are made by bakers and confectioners on a large scale, one firm in Wisconsin alone using ten tons of honey annually in their manufacture.

Honey-gems. 2 qts. flour, 3 tablespoonfuls melted lard, $\frac{3}{4}$ pt. honey, $\frac{1}{2}$ pt. molasses, 4 heaping tablespoonfuls

brown sugar, $1\frac{1}{2}$ level tablespoonfuls soda, 1 level teaspoonful salt, $\frac{1}{2}$ pt. water, $\frac{1}{2}$ teaspoonful extract vanilla.

Honey jumbles. 2 qts. flour, 3 tablespoonfuls melted lard, 1 pt. honey, $\frac{1}{4}$ pt. molasses, $1\frac{1}{2}$ level tablespoonfuls soda, 1 level teaspoonful salt, $\frac{1}{4}$ pt. water, $\frac{1}{2}$ teaspoonful vanilla.

There are innumerable recipes for making cakes and candies of honey, and fruits are still often preserved in it. Jams too are made with honey, and fresh fruits may be kept by simply covering them with honey and allowing them to stand, when they are said to acquire a delicious flavor; this is more reasonable than the statement of Hippocrates, that if the seeds of cucumbers and other plants are first soaked in honey and then planted, "the fruit that groweth of them will taste the sweeter."

A delicious vinegar can be made from honey, which some prefer even to wine vinegar.

A pound and a half of pure honey to a gallon of water is the usual recipe for vinegar, in which fermentation may be hastened by adding a little mother of vinegar.

The value of honey as a food and its superiority to sugar is recognized in many homes, where it is in constant use, particularly for children.

It has always been considered good for the aged, and there was a wide-spread belief in former times that it preserved those who ate it to an extreme old age; and Pliny tells us that the people of Corsica were famous for being long-lived, and that this was attributed to their use of honey.

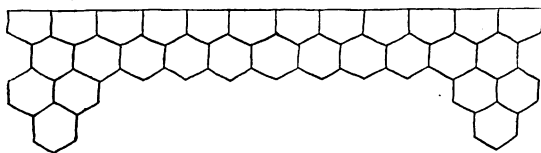
Besides the large apiaries containing thousands of hives and yielding an annual income of many thousands of dollars, there are everywhere to be seen in this country stands of half-a-dozen or more hives kept by the farmers, who sometimes make as much profit from their bees as from their cattle or other live-stock.

Again, one may see a row of hives in a village yard, or even in the yard or on the house-roof in a large city, where the eager little workers hie them away to the parks or the back yards and bring home abundant stores of sweets. The present writer, while walking in a crowded part of New York City, has had a handful of flowers plundered by honey-bees.

Sometimes a glass hive is attached to a school-room window, where the children at any time can safely watch the movements of the busy occupants.

Again, the glass hive has its place in the home, affording recreation to the family.

There has been such a revival of interest in bees and honey the past few years that the hive is almost as common in many sections as the hen-house or the corn-crib.



XIII

MEAD

MEAD, made from honey and water fermented, was the wine of the Northern peoples, being to them what the Blessed Soma juice was to the Hindus, palm and date wine to the Egyptians, and the fermented juice of the grape to the Greeks and Romans.

The Hindus also used mead, though as a more common drink, and we know it was used in Greece and Italy both as a drink and for sacrifices.

Apollonius Rhodius, about 235 B.C., in his "Argonauts," tells that before embarking they rested on the shore.

"And beside them lay vast stores of food and sweet mead, which cupbearers drew forth in beakers."

And again he says of Idas, one of the Argonauts, —

"He spake ; and grasping in both hands a full goblet, drank off the pure sweet mead."

When about to start they made their oblations, as Apollonius Rhodius takes care to inform us, —

"And now were the cables drawn in, and they poured a cup of mead upon the sea."

The Abyssinians are also known to have used mead ; in short, nearly all peoples at some time or other have valued it.

But it is in the heroic Northern age that we find mead the drink of the heroes. In the great feasting halls fair hands held the cup that crowned the feast.

These cups were sometimes "golden goblets ;" again, they were "horns" made from ox-horns or earlier from the capacious horns of the orochs curiously carved, often of enormous size, and frequently supplied with feet so that they could be set down when full.

In the Rune calendar two drinking horns crossed signify January first, the time of the New Year's feast ; and another of the signs of the Rune calendar, denoting the month of September, is a bee-hive, "betokening the time for collecting the honey of the bee, which was so necessary in the preparation of the mead."

At the New Year's feast and the continuing Yule festivities, drinking-horns filled with mead passed incessantly around the board.

In the sixth century, long before the "Eddas" were written, the Cymric bard Aneurin opens the "Gododin" with these glorious words in praise of Owain, —

"He was a man in mind, in years a youth, And gallant in the din of war ; Fleet, thick-maned chargers Were ridden by the illustrious hero ; A shield, light and broad, Hung on the flank of his swift and slender steed ; His sword was blue and gleaming, His spurs were of gold, his raiment was woollen. . . . Thou hast gone to a bloody bier, Sooner than to a nuptial feast ! Thou hast become a meal for ravens, Ere thou didst reach the front of conflict ! Alas, Owain ! my beloved friend ; It is not meet that he should be devoured by ravens ! There is swelling sorrow in the plain, Where fell in death the only son of Marro. Adorned with his wreath, leader of rustic warriors, whenever he came Unattended by his troop, he would serve the mead before maidens. But the front of his shield would be pierced, if ever he heard the shout of war. No quarter would he give to those whom he pursued ; Nor would he retreat from the combat until blood flowed ; And he cut down like rushes

the men who would not yield. The Gododin relates, that on the Coast of Mordei, Before the tents of Madog, when he returned, But one man in a hundred came with him."

Farther in the story we learn that mead was not always a blessing to the heroes.

"The heroes marched to Cattraeth, loquacious was the host; Blue mead was their liquor, and it proved their poison; In marshalled array they cut through the engines of war; And after the joyful cry, silence ensued! They should have gone to churches to perform penance; The inevitable strife of death was about to pierce them. The heroes marched to Cattraeth, filled with mead and drunk, Compact and vigorous; I should wrong them were I to neglect their fame; Around the mighty, red, and murky blades, Obstinate and fiercely the dogs of war would fight."

Later we read, —

"The heroes marched to Cattraeth with the dawn; Their peace was disturbed by those who feared them; A hundred thousand with three hundred engaged in mutual overthrow; Drenched in gore, they marked the fall of the lances; The post of war was most manfully and with gallantry maintained, Before the retinue of Mynyddawg the Courteous. The heroes marched to Cattraeth with the dawn; Feelingly did their home friends regret their absence; Mead they drank, yellow, sweet, ensnaring; That year is the point to which many a minstrel turns; Redder were their swords than their plumes, Their blades were white as line; and into four parts were their helmets cloven, Even those of the retinue of Mynyddawg the Courteous."

After the battle of Cattraeth, —

"Yudwlch and Cywllch the Tall drank the bright mead together by the light of torches; though pleasant to the taste, a fatal foe. Gwarthleo was of the number, young,

rich, ever pressing forward, and there too was the gigantic Gwrneling. In the early dawn bright was the horn in the hall of Eiddin, pompous the feast of mead at the meeting of reapers. Men drank transparent wine with battle-daring purpose. The reapers sang of war, war with the shining wing ; the minstrels sang of war, of harnessed war, of winged war.

“The heroes who marched to Cattraeth were renowned, Wine and mead out of golden goblets was their beverage, That year was to them one of high solemnity, Three hundred and sixty-three chieftains, wearing the golden torques ; Of those who hurried forth after the excess of revelling, But three escaped by valour from the funeral fosse. The two war-dogs of Aeron, and Cynon the dauntless, And myself from the spilling of blood, the reward of my pure song.

“When Caradawg rushed into battle, It was like the tearing onset of the woodland boar ; Bull of the army in the mangling fight, He allured the wild dogs by the action of his hand ; my witnesses are Owain the son of Eulat, And Gwrien, and Gwynn, and Gwriad ; But from Cattraeth, and its work of carnage, From the hill of Hydwn, ere it was gained, After the clear mead was put into his hand, He saw no more the hill of his father. The warriors marched with speed, together they bounded onward ; Short-lived were they, — they had become drunk over the distilled mead. The retinue of Mynyddawg, renowned in the hour of need ; Their life was the price of their banquet of mead.”

“My limbs are racked, And I am loaded, In the subterranean house ; An iron chain Passes over my two knees ; Yet of the mead and of the horn, And of the host of Cattraeth, I Aneurin will sing What is known to Taliesin, Who communicates to me his thoughts, Or a strain of Gododin, Before the dawn of the bright day.”

In that old Anglo-Saxon pagan poem "Beowulf" of the seventh or eighth century, mead flows freely.

Hrothgar was the son of Healfdene, who was the son of an older Beowulf.

"Through Hrothgar's mind it ran that he would bid men make a hall, the greatest mead-house ever known, and there within deal out to young and old all that God gave him, except the share of the people and the lives of men. Widely it was proclaimed through this mid earth to many a tribe that a Folkstead was building. When it was ready, to this greatest of halls he who had strength in his word gave the name Heorot. He belied not his pledge, but dealt out bracelets and money at the feast. The hall rose high and horn curved. There was the harp strung, loud was the song of the gleeman, who said he could tell from far back the beginning of men, and told how the Almighty wrought. The band of guests lived happily till one wrought like a fiend."

This one who thus wrought was Grendel, a monster of the fens, son of a daughter of Cain.

Every night he entered the hall and killed the heroes.

Beowulf the Goth came from over the seas to rescue them, and Hrothgar's queen at the banquet given to Beowulf, their deliverer, passed the cup.

"Then she went round, and gave on every side rich vessels to old and young, until she bore the mead-cup, bracelet-covered queen, to Beowulf."

Beowulf killed the monster, and presents were heaped upon him and his followers.

The queen said: "Take this cup, dear lord, and be thou happy, golden friend of men; speak to the Goths kindly. Heorot, bright hall of rings, is cleansed. Enjoy the mead of the many, and leave to thy sons folk and land when thou must forth to behold God."

The mother of Grendel appeared to avenge her son and was followed to the fen and slain ; thereupon, their work finished, "The bright warriors went to the ship, laden with weapons, steeds, and gold ; the mast rose over Hrothgar's boards. Beowulf gave to the boat-guard a sword bound with gold, and on the mead-bench he was afterwards the worthier for that heirloom."

From a fragment of heroic Anglo-Saxon poetry we get this : —

"Never have I heard of sixty conquering heroes who better bore them at a conflict of men, nor ever requite song or bright mead better than his young warriors requited Hnæf."

In Scandinavia mead was a national drink, and none who know the delights of Valhalla itself can doubt that mead flowed in those high halls where all were heroes !

Honey dropped from the leaves of the sacred ash Ygdrasil, as in ancient Greece it dropped from the oak of Zeus ; but the mead of Valhalla, as we learn from the "Younger Edda," was derived from another source.

Odin received the Einheriar, or heroes slain in battle, in Valhalla. "Then asked Gángleri *the Wayfarer*, 'What have the Einheriar to drink, which can supply them together with their meat (the flesh of the ever-renewed boar Sæhrimner), or is water their drink there?' Then answered Hár (the Lofty One), 'Wonderfully spierest thou now, that Allfather should bid to him King or Jarls or other chief men, and should give them water to drink ! And, indeed, many men, I trow, come up to Valhall, who, we should think, had dearly bought their water-drinking, if no better cheer could be expected there, — even such as have suffered wounds and pains unto the death. Nay ! something very different have I to tell thee there-about. A goat there is, hight Hejdrun, which standeth up in Val-

The Honey-Makers

hall and biteth leaves from the branches of that right famous tree called Lerathr. Now from out her teats there runneth so much mead, that she filleth therewith each day a drinking vessel so huge that all the Einheriar are made drunken thereby?' 'Then quod Gángleri, 'Most curious surely is that Goat, and right excellent must be the tree whose leaves she croppeth.'"

From the "Elder Edda" we learn that Odin daily visited Saga, the Goddess of History, and drank with her mead from out a golden bowl.

In the "Elder Edda" we also learn how Heimdal, the ward of the gods, guarding the bridge to heaven against the mountain giants, sustains himself by means of mead.

"Himinbjorg it is called,
Where Heimdal rules
Over his holy halls;
There drinks the ward of the gods
In his delightful dwelling
Glad the good mead."

In the "Eddas" mead flows as freely as in the Anglo-Saxon poems; every guest has it pressed upon him.

"The massy flagon deign to wield,
With generous cool metheglin filled,"

is ever the invitation, though the wording may differ, as

"Bid him welcome, maiden; haste,
Let him our metheglin taste."

In "Tegner's Frithiof's Saga," when King Bele feels his death approaching, he says:—

"My mead-cup's flavor all is gone,
The helm weighs down my brow;
My vision fails to trace the lines
Of human weal and woe;
But nearer, brighter, *Valkall* shines,—
My death's at hand, I trow!"

The mead-hall was the meeting-place of heroes where,
“Went there at times a fair maid round the board, upfilling the
mead-horns, —
Blush’d she with downcast eyne, — in the mirrowing shield her
image,
Even as she blush’d too; — how it gladdened the deep-drinking
champions!”

After the battle, the feast; care has no place here.

“What wilt thou? — For have we not more than we need
Of rich yellow bacon and brown-foaming mead?”

In Frithiof’s Saga we have the hero’s love song in which
he assures his beloved, —

“Did Valhall’s blushing maids round-proffer
The Mead-Horns, rich with foam of gold, —
I Thee alone would pledge, Thee offer
In gentle whispers love untold.”

The fatal potency of mead was not ignored even in song,
for in the “Elder Edda,” where Lok picks a quarrel with
Elder, we read: —

“For Asi sons the bowl I fill
With mead, the source of many an ill.”

A fearful revenge did Gudrun take upon her husband
Atli, in one of the oldest epics of the north. The mead she
brewed him was mixed with the blood of his — and her —
sons, because he had killed the brothers of his fierce spouse.

When Atli returned from the carnage Gudrun received him.

“The bright-faced Gudrun, that fierce lady, hastened to
bear the wine to the lords, and in her cruelty to share
out the dainty morsels to the pale-faced princes, but to Atli
she spoke a word of mockery. ‘Thou hast eaten the fresh-
bleeding hearts of thy sons, mixed with honey, thou giver
of swords. Now thou shalt digest the gory flesh of man,
thou stern king, having eaten of it as a dainty morsel, and
sent it as a mess to thy friends. Never shalt thou, merry

with ale, call thy two sons, Erp and Eitil, to thy knees from thy high seat. Thou shalt never see in the midst of thy court the young princes shafting their spears, clipping their horses' manes, or spurring their steeds !' "

Again, in a fragment of an Atli lay, Atli says to Gudrun : " I dreamed that two hawks flew off my hand, famished for food. I dreamed that in sorrowful mood I ate their hearts all full of blood, dressed with honey."

In the early Christian ages mead was still a favorite drink, and in the " Legends of the Holy Rood," belonging from the eleventh to the fifteenth centuries, we find it occasionally mentioned.

In the " Dispute between Mary and the Cross " occur these curious lines : —

" Adam drowned his ghost in bitter gall ; instead of this gall God gave us mead ; with sweet mercy the bitterness is quenched." And again in the same legend, —

" The fell Jews, stone-hearted in dark sins, have beaten a lamb, — softer than milk or mead mixed together. Like hard stones were the Jews. Softer than dew on the lilly-flower, was Christ's body in bloody colours."

Mead, or meth, as it is often written, was still a common drink in Chaucer's time, and in the " Knight's Tale," Emelye, going to sacrifice at Diana's altar, took

" Hir maydens, that she thider with hir ladde,
Ful redily with hem the fyr they hadde,
Thencens, the clothes, and the remenant al
That to the sacrificye longen shal ;
The hornes full of *meth*, as was the *gyse* ;
Ther lakked noght to doon hir sacrificye."

And in the " Miller's Tale," we are told of the carpenter's wife that, —

" Hir mouth was swete as bragot or the *meeth*,
Or hord of apples leyd in hey or heeth."

Although the people drank sack instead of mead in Shakespeare's time, the bard of Avon occasionally refers to the older and no longer universal drink. In "Merry Wives of Windsor," Sir Hugh Evans anathematizing Falstaff declares him to be given to "sack and wine, and metheglins," and in "Love's Labour's Lost" Biron, jesting with the princess, uses the words "metheglin, wort, and malmsey," as illustrations of things that are sweet.

Yet mead was a drink for royalty, concerning which Butler tells us : —

"He who liketh to know the many and sundry makings of this wholesome drink must learn it of the ancient Britains : who therein do pass all other people. One excellent receipt I will here recite : and it is of that which our renowned Queen Elisabeth, of happy memory, did so well like, that she would every year have a vessel of it.

"The Queen's Metheglin. First, gather a bushel of sweetbriar leaves, and a bushel of thyme, half a bushel of rosemary, and a peck of bay-leaves. Seethe all these (being well washed) in a furnace¹ of fair water ; let them boil the space of half an hour, or better : and then pour out all the water and herbs into a vat, and let it stand until it be but milk warm : then strain the water from the herbs, and take to every six gallons of water one gallon of the finest honey, and put it into the boorne, and labor it together half an hour : then let it stand two days, stirring it well twice or thrice each day. Then take the liquor and boil it anew : and when it doth seethe, skim it as long as there remaineth any dross. When it is clear, put it into the vat as before, and there let it be cooled. You must then have in readiness a kiv(e) of new ale or beer, which as soon as you have emptied, suddenly whelm it upside down, and set it up again, and presently put in the metheglin, and let it stand

¹ According to Bevan not less than 120 gallons.

three days a working. And then tun it up in barrels, tying at every tap-hole (by a pack thread) a little bag of beaten cloves and mace, to the value of an ounce.

"It must stand half a year before it is drunk."

Such was the mead of good Queen Bess.

We of to-day would like to taste this beverage so agreeable to the royal palate of another age, but Elizabeth's recipe offers difficulties which few will take the trouble to surmount.

Bevan gives the following recipe for mead, which though it lacks the most attractive ingredients of the queen's drink possesses the advantages of being understandable and simple : —

"Dissolve an ounce of cream of tartar in five gallons of boiling water ; pour the solution off clear upon twenty pounds of fine honey, boil them together, and remove the scum as it rises. Towards the end of the boiling add an ounce of fine hops ; about ten minutes afterwards put the liquor into a tub to cool ; when reduced to a temperature of 70° or 80° Fahrenheit, according to the season, add a slice of bread toasted, and smeared over with a very little yeast ; the smaller the quantity the better, for *yeast invariably spoils the flavor of wines*, and where there is a sufficiency of extractive matter in the ingredients employed, it should never be introduced : if fermented in wooden vessels none is required. The liquor should now stand in a warm room, and be stirred occasionally. As soon as it begins to carry a bead it should be tunned, and the cask filled up from time to time from the reserve, till the fermentation has nearly subsided. It should now be bunged down, leaving open a small peg-hole ; in a few days this may also be closed, and in about twelve months the wine will be fit to bottle."

Those impatient to test the result of their brewing may make their mead thus : —

"Wash refuse combs in water, after extracting from them as much of the honey as will run ; then boil for a few minutes. This liquor will not require tartar or yeast. It should be tunned as soon as cool, bunged down in three or four days, and drunk in a few weeks."

This is simplicity itself, and Thorley gives us another simple recipe for mead, which, he affirms, is "not inferior to the Best of foreign Wines."

"Put three pounds of the finest Honey to one Gallon of Water ; boil it half an Hour (well scummed) then put in while boiling two Lemon Peels to each Gallon of the un-boiled mixture. Work it with Yeast, then put it in your vessel with the Peel, to stand five or six months, and bottle it off for your use.

"N. B. If you chuse to keep it several years put four Pounds to a Gallon."

Bevan says, —

"In some parts of Wales the refuse combs are brewed with malt, spices, etc., and the produce is called *Braggot*, a name derived from the old British words *brag* and *gots*, the former meaning *malt*, the latter *honey-comb*."

Metheglin is said to have been mead of the best quality, and in literature metheglin is frequently used instead of mead.

Butler instructs us thus concerning the virtue and the making of burnt metheglin : —

"And as good and old metheglin excelleth all wines, as well for pleasantness in taste as for health ; so being burnt, it is better than any burnt wine, for comforting and settling of a weak and sick stomach, and for creating the natural heat.

"The manner of burning it (if you know not) may be this : First set on the fire a deep skillet or kettle almost full of water : when it boileth, put in a pewter pot full of

metheglin : before that beginneth to boil, skim it, and put in two or three bruised cloves, and a branch of rosemary : then beat the yolk of an egg in a dish : put into it a spoonful of the mead cold : and stir them together, to keep the yolk from curdling : then put to that a spoonful of the hot meth ; and after that another, and an other, always beating them together : and then, some and some, put all into the pot, still stirring it about. Then as soon as it boileth, take up the pot : and (saving your hands harmless) pour it into another warm pot of like capacity, firing it as it runneth : and so brew it till it will burn no more. A metheglin posset is of the like virtue."

To-day metheglin is made and used principally as a medicine, being esteemed for coughs and colds, though once the honey drinks were prized as good wines are now.

"There are three things in court which must be communicated to the king, before they are made known to any other person. 1st, Every sentence of the judge ; 2nd, every new song ; and, 3d, every cask of mead," are the commands found in an ancient law of Wales.

Moreover, at the courts of the Princes of Wales the mead-maker was the eleventh person in dignity and took precedence of the physician.

Hydromel, as the name implies, is composed of honey and water, and sometimes is not fermented, but drunk at once ; again, however, it is indistinguishable from mead, being but the Greek name for that liquor.

Pliny says of the unfermented hydromel that it "is an extremely wholesome beverage for invalids who take nothing but a light diet ; it reinvigorates the body, is soothing to mouth and stomach, and by its refreshing properties allays feverish heats. It is well suited for persons of a chilly temperament, or of a weak and pusillanimous constitution."

Pliny also considers hydromel valuable in diminishing "asperities of the mind," adding : —

"There is no one in whom anger, affliction, sadness, and all the emotions of the mind may not in some degree be modified by diet. It will therefore be worth while to observe what aliments they are which exercise a physical effect, not only upon the body, but the disposition as well."

A piece of advice which it might be wise to heed in these later days, and, if honey and water are indeed efficacious in sweetening an acid nature, to apply them where the symptoms suggest the remedy.

Pliny's hydromel does not differ materially from the mead of other writers, excepting that it is made from purified rain-water, as the following recipe given by him shows : —

"There is a wine also made solely of honey and water. For this purpose it is recommended that rain-water should be kept for a period of five years.

"Those who show greatest skill content themselves with taking the water just after it has fallen, and boiling it down to one third, to which they add one third in quantity of old honey, and keep the mixture exposed to the rays of a hot sun for forty days after the rising of the Dog-star ; others, however, rack it off in the course of ten days, and tightly cork the vessels in which it is kept. This beverage is known as 'hydromeli,' and with age acquires the flavor of wine. It is nowhere more highly esteemed than in Phrygia."

Moffett declares the following recipes for hydromel to be those recommended by the famous physician Galen : —

"Take sweet pure clean fountain water eight pounds, the best honey one pound, boyl them at a soft fire, in an earthen vessel, take off the skim a top oft times, and boyl it

to its thickness. If it must be drunk presently, it must be made thin as water; if it must be set up to keep, boyl it longer, till it be thick as a julep. It is spiced at pleasure, with Ginger, Saffron, Gallia, Moschata, Lignum aloes, &c. It is made also another way: of honey one pound, water eight pounds, leaven three ounces; put all in a wooden vessel, leaving three or four fingers empty that it may work the better: when it hath done working, stop the vessel and let it be well hoopt, and after three months it will be fit to drink."

Really tempting is the following beverage, which Moffett calls the hydromel of *Æginata*.

"Take the juice of bruised quinces five pounds, fountain water sexterii, boyl them till they grow soft, take them from the fire, let them cool, then strain them and crush out the Quinces and cast them away; add to this water half honey, boyl it, scum it, till an eighth part be consumed: Some make it of sweet apples or pears the same way."

The hydromel of the Muscovites was a malted liquor, and was thus made:—

"Take of the decoction with hops twelve pounds, purified honey scummed, pound and half, toasted bread strowed with flour of malt, one piece, put all into a wooden vessel well covered, and place it near a stool, take away the froth that riseth, twice a day, with a wooden skimmer that hath holes in it; after ten daies set it up in your cellar, after fourteen daies drink it: They make it the same way in summer with fair water, and made this way they drink it in winter, and when they desire to be drunk. In Russ and English they call it *Mede*."

The English had a malted hydromel of their own which Moffett highly commends. "Lately," he says, "the English found out a new composition of Hydromel, (they call it *Varii*) and serves better for ships than any Wine.

"The preparation is this :

"Take Barley torrefied after due steeping in water, what you please, boyl it long in five quarts of fountain water, till it taste well of the malt : one pound of this boyled with eight pounds of honey, and twenty pounds of water, makes a drink that tastes most sweet, and is most healthful for use."

Oxymeli, a drink made from vinegar and honey, is described but not approved by Pliny.

"Vinegar even has been mixed with honey ; nothing, in fact, has been left untried by man.

"This mixture is compounded of ten pounds of honey, five semi-sextarii of old vinegar, one pound of sea-salt, and five sextarii of rain-water. This is boiled gently till the mixture has bubbled in the pot some ten times, after which it is drawn off and kept till it is old ; all these wines, however, are condemned by Themison (as drinks no doubt ; and with good reason as to most of them !), an author of high authority. And really, by Hercules ! the use of them does appear to be somewhat forced, unless indeed we are ready to maintain that these aromatic wines are so many compounds taught us by Nature, as well as those that are manufactured of perfumes, or that shrubs and plants have been generated only for the purpose of being swallowed in drink."

Galen, however, did not despise honeyed vinegar, but gives a simple recipe for making it, unflavored by severe remarks : —

"Let the best honey be clarified, then add so much wine-vinegar to it, that it may please the sick man's palate, boyl them till they are well mingled ; and when you will use it, mingle as much water as you please : it is boyled enough when it sends forth no more scum."

"Honied wine" is frequently referred to by the ancient

writers, who attribute remarkable properties of preserving life to it, and Pliny tells us : " Many persons have attained an extreme old age by taking bread soaked in honied wine, and no other diet — the famous instance of Pollio Romilius, for example. This man was more than one hundred years old when the late Emperor Augustus, who was then his host, asked him by what means in particular he had retained such remarkable vigor of mind and body. 'Honied wine within, oil without,' was his answer."

Honeyed wine is also called *Cenomeli* and *mulsum*, and Moffett says : —

"Aristæus was the first that brought this into Thrace, being taken with the incredible sweetness of Honey and Wine mingled together."

Moffett also gives us a recipe for it : —

"The new writers describe this potion thus, Take one gallon of the best Honey, six gallons of old Wine, Salt two ounces ; it must then be skimmed as it works, then put in the Salt, and season it with annise-seed and roots of Elecampane let down into the vessel with a bag. The Egyptians make it otherwise, namely of Raisins and Honey."

There seems no end to the varieties of honeyed wine and other drinks made of honey which were used by the ancients, one Greek *mulsum* containing thirty-six ingredients, and another kind being described as "true nectar" wont to be made about Mount Olympus in Lydia, of "wine, bees-combs, and sweet flowers."

The *Usquebach* of the Irish is made of honey, wine, and herbs, which beverage Moffett says is "not unfit for a nation that feeds on flesh raw, or but half sod."

One should suppose the following classical drink, called *thalassiomeli*, might merit similar criticism. It is made of "equal parts of sea-water, rainwater and honey purified and set in the sun in a pitched vessel in the Dog-daies" !

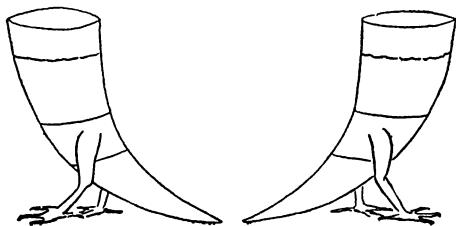
Our old friend Butler caps the climax of these honeyed drinks by offering us one which we would do well to accept. The following is what he has to say about this remarkable "honey altered by distillation into a water, which Raimundus Lullius (that excellent chemist) called the quintessence of honey."

"This quintessence dissolveth gold, and maketh it potable; likewise, any sort of precious stone that is put therein. It is of such virtue, that, if any be dying, and drink two or three drams thereof, presently he will revive. If you wash any wound therewith, or other sore; it will heal quickly."

Indeed, "of so marvellous efficacy is this water" that it will heal many diseases be they never so obstinate.

Fortunately for the world of suffering humanity, the formula of this remarkable beverage has not been denied us. Butler says: —

"The making of it is after this manner. Take two pounds of perfect pure honey, and distil it, when the receiver will contain a water of red color like blood." Keep the receiver tightly closed and let it stand until clear and of the color of a ruby. Then distil it in *Balneo Maria* seven times, when it will lose its reddish color and become as yellow as gold with an "exceeding pleasant smell."



Part II

The Literature and History of the Bee

XIV

IN HINDU LITERATURE

THE Latin writer Varro fancifully calls the bees the Birds of the Muses, thus paying a poet's tribute to the airy creatures that wing their way through the songs of many nations; and nowhere is the title better deserved than in India, where from the earliest times the bees have been the winged darlings of the muses.

Figuring largely in the religion as well as the poetry of the Hindus and constantly appearing in the accounts of the gods the bee is a delightful and omnipresent feature in Hindu literature.

The "Vedas," the oldest literature of India, concerning themselves with the great forces of nature, and drawing their imagery mainly from the phenomena of the sky, are full of allusions to honey and the bee, which play their parts in the stately drama of men and gods.

The word *madhu*, honey, and other words compounded with it constantly occur.

Honey, in the "Vedas," is intimately connected with the symbolism of the sun and the moon, but particularly of the moon.

The two Aświns,¹ children of the sun and moon, spirits of the dawn, giving birth to the new day, demigods who concerned themselves with the welfare of man and gave him good gifts, bore honey in their three-wheeled chariot.

In the old Hindu belief honey gave strength, wealth, good-fortune, knowledge, and offspring to man.

In the "Rig-Veda," the fine invocations to the Aświns contain frequent references to the honey they bear, as is shown by the following : —

"Aświns, men who desire to glorify you with their hymns, cause, as it were, their praises to be heard, propitiating you with oblations ; for, from you who are possessed of all opulence, they obtain every kind of wealth and abundant food. Dasras,² the fellows of the wheels of your honey-laden car drop honey, carried in your golden car."

"When, Aświns, you harness your bounty-shedding chariot, refresh our strength with trickling honey : bestow abundant food upon our people : may we acquire riches in the strife of heroes."

"May the three-wheeled cart of the Aświns, drawn by swift horses, laden with honey, three-canopied, filled with treasure, and every way auspicious, come to our presence, and bring prosperity to our people and our cattle."

"Bring us, Aświns, vigour : animate us with your honied speech : prolong our existence ; wipe away our sins ; destroy our foes ; be ever our associates."

"With those aids by which you defended Kṛiṣānú in battle, with which you succored the horse of the young Purukutsa in speed, and by which you deliver the pleasant honey to the bees ; with them, Aświns, come willingly hither."

¹ Quotations from Hindu literature having been taken from various translators, the accents used are those of the translators quoted.

² Another name for Aświns.

Honey-colored, or resembling honey in purity and pellucidity, is a comparison more than once met with in the "Vedas," as in one of the hymns to the Maruts, the storm-gods or winds.

"When, Maruts, flying like birds along a certain path of the sky, you collect the moving, passing clouds in the nearest portions of the firmament, then, coming into collision with your cars, they pour forth the waters; therefore, do you shower upon your worshipper the honey-colored rain."

Honey played an important part in the religious observances of our Aryan forefathers, as we learn from the "Vedas" and from the "Sûtras," or rituals for domestic ceremonies. Replete with poetry is that part of the marriage ceremony where the husband reciting the Vedic verse "Full of honey the herbs," ties to the body of his bride the madhûka flowers.

And again, where the newly married husband kisses his wife:—

"He then seeks her mouth with his mouth, with the two verses,—

"'Honey! Lo! Honey! This is honey! my tongue's speech is honey; in my mouth dwells the honey of the bee; on my teeth dwells concord.'"

Honey plays an important part in the ceremonies performed over a new-born child, as is shown by the commands of the "Sûtras":—

"Let the father mix together butter and honey, milk, curds and water, or grind together rice and barley, and give it to eat to the child twice from gold (*i. e.*, from a golden vessel or with a golden spoon)."

While touching the tongue of the child with this food the father repeats the verse,—

"I administer to thee honey food for the festival, the wisdom raised by Savitar the bountiful; long-living, pro-

tected by the gods, live a hundred autumns in this world, N. N.!" — and gives him a name.

Although the "Sûtras" compiled by different authors differ somewhat in detail, the use of honey at the birth of the child is almost always a part of the command, as witness the following from another of the "Sûtras": —

"When a son has been born, the father should, before other people touch him, give him to eat from gold, butter and honey with which he has ground gold-dust, with the verse, —

"‘I administer to thee the wisdom of honey, of ghee,¹ raised by Savitri the bountiful, long-living, protected by the gods, live a hundred autumns in this world!’"

When a child is six months old the ceremony for feeding the first solid food is performed. Various substances, selected according to the future needs of the child, as, for instance, flesh of partridge, if the child is desirous of acquiring holy lustre, are mixed with milk, curds, honey and clarified butter and given to the child.

"Such food, mixed with curds, honey and ghee, he should give to the child to eat with the verse, —

"‘Lord of food, give us food painless and strong; bring forth the giver; bestow power on us, on men and animals.’"

At the ceremony of the tonsure of the child's head it is to be observed that —

"He pours cold water into warm with the verse, —

"‘Mix yourselves, ye holy ones, with your waves, ye honied ones, mixing milk with honey, ye lovely ones, for the obtaining of wealth.’"

The young man desiring to establish a family builds for himself a house, and when the post holes are dug he con-

¹ Clarified butter.

secrates his dwelling in the following manner. Pouring water-gruel into the holes he recites, —

“This branch of the immortal one I erect, a stream of honey, promoting wealth. The child, the young one, cries to it; the cow shall low to it, the unceasingly fertile one.”

Putting an Udumbara branch which has been smeared with ghee into the pit for the right door post he recites, —

“This branch of the world I establish, a stream of honey, promoting wealth. The child, the young one, cries to it; the cow shall low to it that has a young calf.”

Thus does he proceed until all of the post holes have been similarly treated and the house has been consecrated and invoked to wealth and numerous offspring such as is bestowed by divine honey.

Although the bees and their honey were eagerly sought after and the bees cultivated as domestic animals by the ancient Hindus, it seems that the voluntary entrance of a swarm into a house was looked upon with suspicion and the subject of such a visitation is enjoined thus : —

“If the bees make honey in his house, —

“Let him fast and sacrifice a hundred and eight pieces of Udumbara wood, which are besmeared with curds, honey and ghee, with the two verses, ‘No harm to us in our offspring.’

“And let him murmur the hymn, ‘For welfare may Indra and Agni.’”

Other sacrifices of wood have also to be made at different seasons to quit him of possible harm from his intruding guests.

Honey has a place in other domestic ceremonies, but plays its most celebrated rôle in the madhuparka offering, which is made upon various occasions but is most widely known in connection with the respectful reception of a guest.

Madhuparka, as the name implies, is a mixture of honey and curds.

Its presentation is extremely ceremonious, and its reception by the guest is accompanied by the recital of the most honeyed composition in Hindu, or any other, literature.

The guest mixes the ingredients of the madhuparka three times from left to right with his thumb and his fourth finger, with the formula, —

“What is the honied, highest form of honey, which consists in the enjoyment of food, by that honied highest form of honey may I become highest, honied, and an enjoyer of food.”

He partakes of it three times with the formula, —

“I eat thee for the sake of brilliancy, of luck, of glory, of power, and of the enjoyment of food.”

The guest is enjoined in the “Sûtras” not to eat the whole of the madhuparka, a dish of which the people were evidently very fond, but to pass on the remnant to some deserving neighbor, or to give it to a friend.

The inmates of the house look at the madhuparka and murmur, “May Indra come thither.”

Mention of honey occurs over and over again in those parts of the books describing the sacrificial rites upon sacred days — of which the Hindu calendar was full. Upon one of these days, for instance, offerings were made thus: —

“Having cooked milk-rice for Indra he sacrifices it, mixed with curds, honey and ghee, to Indra, Indrāntī, the two Aświns, the full moon of Âsvayuga, and to the autumn.”

At the ceremony of the cutting of the beard in the sixteenth year of his age the youth takes upon himself a vow which must be kept a year, a part of the vow being that he shall avoid eating honey and flesh.

As we proceed from the earlier to the later Hindu writings we notice a change. The old Vedic faith becomes displaced by beliefs less simple and more earthy.

We find the gods multiplied in number and their offices grown involved and obscure. But the bees and their honey still occupy their old place in sacrifices and ceremonies. In fact, they too have advanced in complexity of office and are intimately connected with the godhead.

Vishnu has come upon the scene and is the chief of the gods ; from him everything emanates ; he creates everything, he is everything. Vishnu the preserver, the creative force of nature, has closely associated with him the bee, which also represents the creative force in nature and is the symbol of the sweetness and the pain of love.

Of the thousand names which Vishnu finally acquires *madhava*, honey born, or a descendant of *madhu*, honey, is one, while *madhuan*, destroyer of honey, is another.

The great god of gods Vishnu himself is represented at times as a bee lying in the heart of a lotus flower. Vishnu is the god of the sun and the moon, and these also are symbolized by the bee, which, as the dispenser of honey, represents the moon ; as the appropriator of honey, the sun. Honey is supposed to come from the moon, and is very frequently mentioned in connection with it in the old Hindu poems.

When the lotus flower, the symbol of nature, opens, Vishnu the sun-god, the bee at its heart, awakens and goes forth. Light is born, life is born.

The bee thus becomes the symbol of birth upon earth. Hence, and for other reasons, the use of honey at weddings and at the birth of a child.

Thus the bee and its honey in Hindu mythology undoubtedly belong to the sun myths, as is also shown in the stories of the bear.

One of the impersonations of Vishnu is the bear, the *madhuan*, the destroyer of honey.

Vishnu in his mystical rôle of existing in all things is at times his own destroyer. As the *madhuan* he leads to the destruction of the honey in the sacred honey forest.

The bear despoils the bees, that is, Vishnu the sun, the day, overcomes Vishnu the moon, the night.

But again the angry bees revenge themselves by killing the bear. That is, the bees, representing the moon or night, overcome the sun.

Krishna and Brahma, the principal forms of Vishnu, are also like him *madhava*, born of honey, and Krishna is often portrayed with an azure bee upon his forehead, azure being the color of the sky, of the pure aerial spaces which the gods inhabit.

Kāma, the Hindu god of love, requires the help of the bees in performing the duties of his delicate and difficult office. In the "Purānas," the later Hindu books, Kāma is represented as a beautiful youth who travels about through the three worlds accompanied by his lovely wife Rati, by the cuckoo, the humming-bee, spring personified, and gentle breezes.

The bow he bears is sometimes made of sugar cane to symbolize the sweetness of love, and it is strung by a chain of bees, symbolizing the pain of love and also the source of sweetness; his arrows are tipped with flowers, the red mango blossom being the favorite, as it is also the favorite of the bees.

The word *madhukara* means both bee and lover, and also means the moon.

"The Purānas distribute the earth into seven concentric circles or rings each forming an annular continent, and being separated from the next in succession by a circumambient ocean. These oceans vary also as to their constituent

parts ; and besides seas of fresh and salt water, we have them of treacle, honey, milk and wine."

The early Hindu world very closely resembled the Golden Age of the Greeks, as is described in a splendid passage in the "Vishnu-Purána."

"The waters became solid, when he (the mighty Pířthu) traversed the ocean : the mountains opened him a path : his banner passed unbroken through the forest : the earth needed not cultivation ; and, at a thought, food was prepared : all kine were like the cow of plenty : honey was stored in every flower."

In the later writings we find that honey has not lost its place in ceremonials, but as of old is used at bridals and is put upon the tongue of the new-born male child.

It is also an important factor in the respectful reception of a guest.

Honey is necessary at ancestral ceremonies, as we learn from the following : —

"The flesh of the rhinoceros, Kálašáka (pot herb, sacred basil), and honey are, also, especial sources of satisfaction to those worshipped at ancestral ceremonies."

"In former times, O king of the earth, this song of the Pítřis was heard by Ikshwáku, the son of Manu, in the groves of Kalápa.

"Those of our descendants shall follow a righteous path, who shall reverently present us with cakes of Gayá. May he be born in our race, who shall give us, on the thirteenth of Bhádrapada and Mágha, milk, honey and clarified butter : or when he marries a maiden, or liberates a black bull, or performs any domestic ceremony agreeable to rule, accompanied by donations to the Brahmans.'"

The student learning the sacred books is prohibited the use of honey and flesh and to eat of these necessitates a penance.

One of the rights of the king is to collect as taxes from his subjects a sixth part of the honey they gather.

And whosoever steals honey shall pay three times its value.

The souls of men upon death transmigrate into the bodies of animals and very frequently into bees — if the men were wise and good enough to deserve such an honor.

We learn that upon his death, "One who has stolen honey becomes a gadfly."

A householder in passing honey must turn his right side towards it, the same as when passing a deity.

The householder must not eat all of the food set before him, "Unless it consist of sour milk, or honey, or clarified butter, or milk, or ground barley, or meat, or sweetmeats," these evidently being considered the necessities of life.

By giving clarified butter, honey or oil, the pious man becomes exempt from disease.

While he who would be beautiful may become so by help of honey.

"He who feeds on the Revatī day of every month three Brāhmanas with rice boiled in milk with sugar and mixed with honey and clarified butter, in order to please the goddess Revatī, obtains beauty."

It is a very different form of religion, as we see, that the bees are called upon to witness in these later days. The stately march of the clouds and the heavenly phenomena which form the imagery of the "Vedas," are replaced by earthly images.

In the "Institutes of Vishnu" we read the following description of the goddess of the Earth : —

"Her eyes were similar to the leaves of the blue lotus (of which the bow of Kāma, the god of love, is made) ; her face was radiant like the moon in the autumn season ;

her locks were as dark as a swarm of black bees ; she was radiant ; her lip was red like the Bandhugîva flower ; and she was lovely to behold."

A new literature in time sprang into being, but the charm of its nature pictures was still enhanced by the never-failing presence of the bees.

Kālidāsa, the greatest Hindu dramatist, in the sixth century, brought forth his delightful creations and sang the bee into innumerable and immortal love poems.

Kālidāsa's most popular drama, "Sākuntalā, or the Lost Ring," would lose at least a part of its charm if deprived of the music of the bees.

At the very opening, before the play begins, as was the custom, a singer delighted the audience with a song.

"Fond maids, the chosen of their hearts to please,
Intwine their ears with sweet Śīrisha flowers,
Whose fragrant lips attract the kiss of bees
That softly murmur through the summer hours."

One could almost follow the course of the story by the stanzas in which bees are mentioned.

King Dushyanta riding in the forest comes upon the hermit's lovely daughter, Sakoontalā, watering the flowers, and driving away a bee that tries to settle upon her face. Whereupon his majesty, gazing ardently upon her, thus expresses his feelings : —

"Beautiful ! there is something charming even in her repulse.
Where'er the bee his eager onset plies,
Now here, now there, she darts her kindling eyes
What love hath yet to teach, fear teaches now,
The furtive glances and the frowning brow."

In a tone of envy he continues : —

"Ah, happy bee ! how boldly dost thou try
To steal the lustre from her sparkling eye ;

The Honey-Makers

And in thy circling movements hover near,
 To murmur tender secrets in her ear ;
 Or, as she coyly waves her hand, to sip
 Voluptuous nectar from her lower lip !
 While rising doubts my heart's fond hopes destroy,
 Thou dost the fulness of her charms enjoy."

Sakoontalá, reclining upon a couch of flowers, requests the king to leave her, upon which she receives the ardent reply : —

" When I have gently stolen from thy lips
 Their yet untasted nectar, to allay
 The raging of my thirst, e'en as the bee
 Sips the fresh honey from the opening bud."

An early love of the king, fearing his disaffection, is heard to sing, —

" How often hither did'st thou rove,
 Sweet bee, to kiss the mango's cheek
 Oh ! leave not then thy early love,
 The lily's honeyed lip to seek."

The mango — "this tree the favorite of Love and the darling of the bees" — is a favorite of the poet as well, and "red mango buds" blush from nearly every page, while one seldom finds the mango without finding at the same time its companion and lover, the bee. The mango and the lotus vie with each other in the favor of the Hindu poet, and the bees linger lovingly about both of them.

As the result of a curse, Dushyanta forgets his wife Sakoontalá after he has married her and when she appears before him he exclaims : —

" What charms are here revealed before mine eyes !
 Truly no blemish mars the symmetry
 Of that fair form ; yet can I ne'er believe
 She is my wedded wife ; and like a bee

That circles round the flower whose nectared cup
Teems with the dew of morning, I must pause
Ere eagerly I taste the proffered sweetness."

The king warns the bee that hovers about the lips of Śakoontalā's picture : —

"Dost thou presume to disobey ? Now hear me —
An thou but touch the lips of my beloved,
Sweet as the opening blossom, whence I quaffed
In happier days love's nectar, I will place thee
Within the hollow of yon lotus cup,
And there imprison thee for thy presumption."

Kālidāsa's "The Birth of the War God," is also rich in exquisite love songs, and through the whole is intertwined the song and the flight of the bee.

The poet describes the love that Umā's father bears to her. She was to him what the mango blossom was to the bee. He loved her above all things, just as —

"When spring-tide bids a thousand flowerets bloom,
Loading the breezes with their rich perfume,
Though here and there the wandering bee may rest,
He loves his own — his darling mango — best."

Umā is destined to become the bride of Śiva, who has become a hermit, and all the forces of Kāma, the god of love, his humming bees, his flowery shafts, his companion and helper Spring, are brought to bear upon the stern deity. In the hermit's grove, Spring, wondrous to behold, appears, to turn the hermit from his thoughts on things above.

"There grew Love's arrow, his dear mango spray,
Winged with young leaves to speed its airy way,
And at the call of Spring the wild bees came,
Grouping the syllables of Kāma's name."

Sweet wanton Spring : —

The Honey-Makers

"Who loves to tint his lip, the mango spray,
With the fresh colors of the early day,
And powder its fine red with many a bee
That sips the oozing nectar rapturously."

"For there in eager love the wild bee dipped
In the dark flower-cup, where his partner sipped."

"no dweller of the forest stirred,
No wild bee murmured, hushed was every bird."

Surely it would be a strong hermit who could hold out against such forces, and when the lovely Umá herself appeared with her train of maidens the heart of the god was melted within him.

The poet cannot sufficiently express her charms without telling us that —

"A greedy bee kept hovering round to sip
The fragrant nectar of her blooming lip.
She closed her eyes in terror of the thief
And beat him from her with a lotus leaf."

Love, "the god of the flowery shafts," sent his arrow into Siva's heart, but the merciless deity, inflamed with anger, slew the gentle god of love with a glance of his eye.

In a moment Káma was reduced to ashes, and we have the lament of Rati, his wife, the goddess of love.

"Say, Káma, say, whose arrow now shall be
The soft green shoot of thy dear mango tree,
The favorite spray which *Kóils*¹ love so well,
And praise in sweetest strain its wondrous spell ?
This line of bees which strings thy useless bow
Hums mournful echo to my cries of woe."

Umá, refused by Śiva, takes upon herself the most austere vows, and her mother fears for her daughter's strength in the performance of them, for —

¹ The Indian cuckoo.

"The lily, by the wild bee scarcely stirred,
Bends, breaks and dies beneath the weary bird."

Although Umá has undertaken the life of a recluse in the forest we learn that —

"Her matted hair was full as lovely now,
As when 't was braided o'er her polished brow.
Thus the sweet beauties of the lotus shine
When bees festoon it in a graceful line."

Finally we find Umá triumphant and arranged for her bridal.

"Less dazzling pure the lovely lotus shines
Flecked by the thronging bees in dusky lines."

The maidens fly to the windows to see the passing of Siva and his bride.

"Oh! what a sight! the crowded windows there
With eager faces excellently fair,
Like sweetest lilies, for their dark eyes fling
Quick glances quivering like the wild bee's wing."

"The murmur of the bee" is a constant accompaniment to Hindu song and love-making, and the music of the bee at times vies with the song of the bird, or even with celestial music.

In Kālidāsa's "Hero and Nymph" the manager repeats before the play begins, —

"What sounds are these in the air, that like the plaintive bleat of lambs, break in upon my speech? Was it the murmur of the bee or *kóil's* distant song, or do the nymphs of heaven as they pass above warble their celestial strains?"

Urvásī, a nymph of heaven, borne in the chariot of the hero Purúravas, of whom she has become enamoured, hearing him speak, says, — nectar here evidently meaning honey, —

"Delightful words! they fall like drops of nectar,
Nor wonder nectar from the moon should flow."

In the same drama of the "Hero and the Nymph" is the following invitation given to the king by his attendant, —

"The bower of jasmynes yonder with its slab of black marble is studded thick with blossoms, and the bees crowd about them in heaps; it invites your majesty to repose."

There is nothing finer in all Kálidása's three dramas than the search of King Purúravas for his bride, Urvási, who has fled from him in a pet and been changed into a vine. As he searches for her through the forests, strains are heard in the air.

"The tree of heaven invites the breeze,
And all its countless blossoms glow;
They dance upon the gale; the bees
With sweets inebriate, murmuring low,
Soft music lend, and gushes strong
The *kôil's* deep thick warbling song."

The king, seeking his bride, calls upon the clouds and upon all the creatures he meets in exalted strains. Everything reminds him of his beloved, and finally he asks the bee to tell him where she is.

"How beautiful the lotus! — it arrests
My path and bids me gaze on it — the bees
Murmur amidst its petals — like the lip
Of my beloved it glows."

"Say, plunderer of the honeyed dew, hast thou
Beheld the nymph whose large and languid eye
Voluptuous rolls, as if it swam with wine?
And yet methinks 't is idle to inquire;
For had he tasted her delicious breath,
He now would scorn the lotus. I will hence."

Still pursuing his search the king sings, likening his beloved to the sacred river Ganges: —

"Be not relentless, dearest,
Nor wroth with me forever.
I mark where thou appearest
A fair and mountain river.

"Like Gangá proud thou showest,
From heavenly regions springing;
Around thee, as thou flowest,
The birds their course are winging.

"The timid deer confiding,
Thy flowery borders throng;
And bees, their store providing,
Pour forth enraptured song."

Coming upon the vine into which the nymph has been changed, the king pauses, filled with a strange emotion, and addresses the now flowerless vine, —

"No bees regale her with their songs; silent
And sad, she lonely shows the image
Of my repentant love, who now laments
Her causeless indignation. I will press
The melancholy likeness to my heart."

In his embrace the vine changes into the nymph and he sings in a very different mood, —

"I have sued to the starry-plumed bird,
And the *kūil* of love-breathing song;
To the lord of the elephant herd,
And the bee as he murmured along;
To the swan, and the loud waterfall,
To the *chakwa*, the rock and the roe.
In thy search have I sued them all,
But none of them lightened my woe."

In the drama of the "Toy Cart," written by Çūdraka, the most Shakespearian of the Hindu dramatists, and contemporary with Kālidāsa, we find the verse more dignified, if less graceful, and the bee as much a favorite as ever.

Chárudatta, a Brahman who has impoverished himself by his munificence, says to his friend, —

“ I do not, trust me, grieve for my lost wealth :
 But that the guest no longer seeks the dwelling,
 Whence wealth has vanished, does, I own, afflict me.
 Like the ungrateful bees, who wanton fly
 The elephant's broad front, when thick congeals
 The dried-up dew, they visit me no more.”

In the same play in the description of a house of many courts we read the following : —

“ The flute here breathes the soft hum of the bee, whilst here a damsel holds the *viná* in her lap, and frets its wires with her finger-nails ; some damsels are singing like so many bees intoxicated with flowery nectar ; others are practising the graceful dance, and others are employed in reading plays and poems. The place is hung with water jars, suspended to catch the cooling breeze.”

“ How bravely the old garden looks,” says Chárudatta's servant as he conducts his master hither, and Chárudatta replies : —

— “ 'T is true ; like wealthy merchants are the trees
 Who spread in clustering flowers the choicest wares ;
 Amongst them lustily the bees are straying
 To gather tribute for the royal hive.”

Chárudatta, in court, accused of murder, says : —

“ When first the flower unfolds, as flock the bees
 To drink the honeyed dew, so mischiefs crowd
 The entrance opened by man's falling fortune.”

Defending himself later, he says : —

“ For me — you know me — would I pluck a flower,
 I draw the tender creeper gently to me,
 Nor rudely rob it of its clustering beauty.
 How think you then ? — could I with violent hands
 Tear from their lovely seat those jetty locks,
 More glossy than the black bee's wing ? ”

In the "Stolen Marriage," a drama written somewhat later by Bhavabhūti, "he in whose throat eloquence resides," we have the same sensuous imagery, the beauty and delight of nature enhanced by the murmur of the bees :

—— " I went

To Kāmadeva's¹ temple, where I strayed,
Till weary I reclined beside a fountain
That laves the deep roots of a stately tree,
Whose clustering blossoms wooed the wanton bees
To cull their sweet inebriating fragrance.
Lulled by their songs and tempted by the shade,
I laid me down, and in pure idleness,
To while away the time, I gathered round me
The new fall'n blossoms, and assiduous wove
A flowery garland."

In "The Necklace," the king's confidential companion leads him to the garden.

"This is the place, sir. Behold the rich canopy of the pollen of the mango blossoms, wafted above our heads by the southern breeze, and the chorus bursts from the kóils and the bees to hail your approach."

The king replies : —

"The garden is now most lovely. The trees partake of the rapturous season ; their new leaves glow like coral, their branches wave with animation in the wind, and their foliage resounds with the blythe murmurs of the bee. The *bakula* blossoms lie around its roots like ruby wine ; the *champaka* flowers blush with the ruddiness of youthful beauty ; the bees give back in harmony the music of the anklets, ringing melodiously as the delicate feet are raised against the stem of the *Áśaka* tree."²

¹ Kāmadeva, god of love.

² The *Áśaka* tree was believed to burst into blossom if touched by the foot of a beautiful woman.

The Lover's Song to his Beloved

"Come, love, thou putt'st the night to shame. The beauty of the moon is eclipsed by the loveliness of thy countenance, and the lotus sinks humbled into shade; the sweet songs of thy attendant damsels discredit the murmur of the bees, and, mortified, they hasten to hide their disgrace within the flowery blossom."

In the prose romances written by Bāna in the seventh century we find the wildest extravagance of speech, which is far less pleasing to Western readers than the rich, sensuous, but saner work of the poet Bhavabhūti and of the early writers. Still, there are some beautiful passages and the bees continue as omnipresent as ever, as witness the first part of the following, taken from the description of a sunset in the "Harsa-Carita":—

"Fragrant with the scent of their own honey, the night-lotus beds, to the joy of the bees, commenced to open, like umbrellas of water nymphs, seraglio mansions for the wives of the feathered tribes."

The bees have "sung their sweet songs" often enough in the quotations already given to establish their rights as vocal musicians, but Bāna is not content to let them sing, they must also play upon the lyre, and we are told in the "Harsa-Carita" of a certain king that—

"He was listening like one skilled in music to lute-players, to the tribes of bees in his ear-rings, which with restless feet played a tiny lyre consisting of the end of his ear-ring jewel with the web of its rosy rays for strings."

Bāna tells us of a king from whose "ear-wreath, as he bent down, bees flew away like departing sins all uprooted by Siva worship."

And thus of a queen:—

"She was honey in converse, ambrosia to those who

sought delight, rain to her servants, beatitude to her friends, bamboo-like to her elders."

In a description of beautiful women Bāna tells us that —

"Tribes of bees, attracted by their breath, are their beauteous veils."

The attraction of the bees by a sweet breath is a favorite theme with the later writers, and Bāna gives us the following charming description of a bride : —

"A fragrance of flowers breathed about her, as if she had come forth from the heart of spring. The perfume of her breath attracted the bee tribes, as if she were sprung from the Malaya breeze."

In the folk-songs, too, and in the fables the bee is not wanting. From the "Samadeva" we get the following delightful picture of the man who thinks only of the pleasures of the moment : —

"A traveller, who had slept in a tree in a forest, upon waking saw beneath him a crouching lion, and above him a great hissing boa. In terror he knew not which way to turn.

"Thereupon there trickled down to him from a bee's-nest built in the tree beautiful honey. He tasted it and — straightway forgot his danger!"

"A hunter sold to a merchant a honey-comb. A drop of honey fell from it to the floor. The merchant's cat licked it up.

"The hunter's dog bit and killed the cat.

"The merchant, angered at the death of his beloved cat, struck the dog:

"Then the hunter and the merchant fell upon each other. At the outcry the neighbors hastened thither and there ensued a general fight. They fought and slew each other until all lay dead on the ground — and all on account of a drop of honey!"

A story analogous to the one of not counting your chickens before they are hatched also occurs in the Hindu tales, with the bee instead of the young girl for the victim, and has been thus delightfully translated : —

“ The Bee’s Dream

“ ‘ Night will quickly pass, fair will be the dawn ; the sun will rise in beauty, and the glorious lilies will unfold themselves.’ While a bee sleeping in a flower thus dreamed, came, alas ! an elephant and crushed it as it lay.”

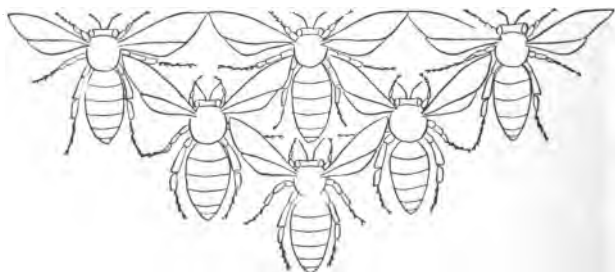
One could go on indefinitely culling allusions to the bee from Hindu literature.

Nowhere has it played so constant and so pleasing a part in the poetry of a people.

This, no doubt, is in part owing to the universal presence of the bee throughout the whole of that mysterious and luxuriant country.

Wild bees everywhere in India build their combs and store their honey in the open air, and to-day the honey of the wild bee is gathered and prized as it was in all former times.

To-day honey is used at sacrifices and other domestic ceremonies, and plays an important part at the wedding and at the birth of a child.




XV

IN EGYPT AND THE EAST

THE most fascinating records of the Egyptian bees are to be found in the hieroglyphics, those picture-writings that furnish the principal part of what we know concerning ancient Egypt.

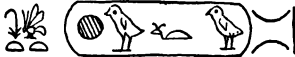
As long ago as the fourth dynasty, nearly four thousand years B.C., the bee figured in the symbolical history of Egypt, for when under the reign of Menes the country was divided into Upper and Lower Egypt, the bee was the symbol of Lower or Southern Egypt, while the lotus was the symbol of the Upper or Northern country.

It is a quaint bee and a quaint lotus that play their parts for centuries as symbols in the history of the Land of the Nile.

The lotus and the bee  standing side by side before the names of the kings signify jurisdiction over both parts of the country, and the bee alone, while it sometimes means a king, is also employed to express a people loyal and industrious, the following being the delightful sign

for the country of Lower Egypt. 

It is of interest to know that the bee as the symbol of kingly power appears upon the hieroglyphical portion of the famous Rosetta Stone.

The pleasing cartouche of Chufu, king of Upper and Lower Egypt, illustrates the method of inscribing a king's name. 

Next in importance to the kingly office was oftentimes the office of the keeper of the treasury, and his title also contains the form of the royal and industrious bee,

thus :



That the bee figured in the religious beliefs of the ancient Egyptians would seem to be indicated by its

presence in the symbol  denoting one of the

priestly orders, and also in that denoting one of this

order of priests.



The word "substance"  likewise contains the figure of the bee, while of the signs meaning "ser-

pent "



one is the bee.

The sign for the arrow



also contains the bee,

the reason for which would seem to be sufficiently obvious, even though it does occur in Egyptian hieroglyphics. Here, as in Hindu, and many other literatures, the bee is

found associated with death



as is

shown by its presence in the symbol of the bier ; while

honey itself is expressed thus :



Maspero lets us into some of the secrets of Egyptian honey by telling us that, of the pigments used in picture-

making, "the white is made of gypsum, mixed with alumen and honey," and also that the smallest of the perfume vases "were not intended for liquids, but for pomades, medicinal ointments, and salves made with honey," which, in conjunction with the perfumed pills that we learn were made in part of honey and "when chewed by women made the breath of their mouth sweet," gives us an insight into the manners of the Egyptian ladies somewhat at variance with the non-frivolous impression they create by their unsmiling visages cut in stone or painted on their tombs.

Piercing as best we can the dim vistas of the past into the ancient life of Egypt, we find the bee, so surrounded by the mysteries and the silences of that strange world that we are puzzled to know all that it stood for in the minds of the people.

It is not here the frank symbol of the sun and the moon so charmingly expressed by the ancient Hindus, and yet there are hints, dim and vague, of a similar meaning accorded to it.

Virgil refers the story of the generation of bees from the body of the sacrificial bull to Egypt. This story is very wide-spread and no doubt is symbolical of the resurrection of the soul after the death of the body. In his fourth "Georgic," Virgil thus describes the generation of bees from the dead animal:—

"But if the whole stock should suddenly fail any one, and he should have no means to recover a new breed, it is time both to unfold the memorable invention of the Arcadian master, and how the tainted gore of bullocks slain has often produced bees. I will disclose the whole tradition, tracing it high from its first source; for where the happy nation of Pellæan Canopus inhabit the banks of the Nile, floating the plains with his overflowing river, and sail

around their fields in painted gondolas, and where the river, that rolls down as far as from the swarthy Indians, presses on the borders of quivered Persia, and fertiles verdant Egypt with black silt, and pouring along divides itself into seven different mouths, all the country grounds infallible relief on this art. First, a space of ground of small dimensions, and contracted for this purpose, is chosen; this they strengthen with the tiling of a narrow roof and confined walls, and add four windows of slanting light in the direction of the four winds. Then a bullock, just bending the horns in his forehead, two years old, is sought out; whilst he struggles exceedingly they close up both his nostrils and the breath of his mouth; and when they have beaten him to death, his battered entrails are crushed within the hide, that remains entire. When dead they leave him pent up, and lay under his sides fragments of boughs, thyme, and fresh cassia. This is done when first the zephyrs stir the waves, before the meadows blush with new colors, before the chattering swallow suspends her nest upon the rafters. Meanwhile the juices, warmed in the tender veins, ferment; and animals, wonderful to behold, first short of their feet, and in a little while buzzing with wings, swarm together, and more and more take to the thin air, till they burst away like a shower poured from summer clouds, or like an arrow from the whizzing string, when the swift Parthians first begin the fight."

It has been suggested, in explanation of the wide-spread belief that bees were generated in dead bodies, that flies were confounded with bees by the ancient naturalists, who therefore believed that bees, like flies, were born from carrion. The old name given in England to the bee, the honey fly, gives force to the suggestion, as also the fact that the North American Indians called the honey bee the white man's fly — showing how generally the two insects have been confused with each other.

We search Egypt in vain for the graceful and sensuous imagery of the Hindus. There are Egyptian love-songs, but the voice of the bee is not in them. Varro's "birds" were not the beloved companions of rural scenes, and if they wove their dark lines across the face of the lotus in Egypt, we are not informed of it. The nearest we come to an appreciation of the bee in Egyptian poetry is in the following : —

"On the festival day of the garden, that is, on the day when the garden was in full bloom, the wild fig-tree calls the maiden to come into the shade of the fig-leaves as a trysting-place.

"The little sycamore¹
Which she planted with her hand,
She begins to speak,
And her words are as drops of honey."

We know that honey was valued in sacrificial rites.

From the great papyrus of Rameses III., in which he gives full details of all he had done for the temples of his country during his reign of thirty-one years, we learn that the following payments of sacrificial funds were made from the royal treasury : —

331,702 jars of incense, honey, and oil.

3,100 uten of wax.

1,933,766 jars of incense, honey, fat, oil, etc.

According to Brugsch Bey, an inscription on a tomb in the necropolis of Abydos in Middle Egypt reads thus :

"The king appoints that a sum of three and a half pounds of silver from the treasury of the temple of Osiris be given annually in order to cover a daily demand for one measure of honey to be used at the ceremony of the worship of the dead for his beloved Naromantha."

¹ Wild fig-tree.

Brugsch also describes a contract in which it is stated :

"I take you to wife and bind myself to furnish to you annually twelve pots of honey."

We know that honey was a common ingredient of the medicines of the Egyptians, and that it was added to the most obnoxious compounds, as of lizard's blood, teeth of swine, putrid meat and stinking fat, the moisture from pig's ears, and excreta of all kinds.

Some of the old remedies, however, were far from objectionable, as, for instance, the following : —

To draw blood from a wound, take of wax, fat, date-wine, honey, and boiled horn each one part.

It was considered really strengthening to the hair to anoint it with the tooth of a donkey crushed in honey!

Bees were carefully cultivated by the ancient Egyptians, who had floating apiaries, or boats bearing hives, that ascended the Nile, and drifted slowly down, following the blossoming of the plants along the banks as the annual inundation receded.

This custom still prevailed in modern times, as the writings of travellers testify. Barges or flatboats proceeded up the river, gathering the hives of the villages as they went, and after a migration of two or three months returned the laden hives to their owners.

It is probable that the ancient bees are the progenitors of those found in Egypt to-day, gray-haired with two bright orange bands on the large end of the abdomen — very yellow and very cross.

In one author we read the following concerning bee-keeping in ancient Egypt : —

"To the garden department belonged the care of the bees, which were kept in hives very much like our own. Honey was thought of great importance, both for household purposes and for an offering to the gods."

It is said that the dead were occasionally preserved in honey, which seems to have been a common practice in some other countries, and Plutarch tells us the following of Agesilaus, who on his way home from Egypt was shipwrecked and perished on a desert shore of Africa : —

“ It was the custom of the Spartans to bury persons of ordinary rank in the place where they expired, when they happened to die in a foreign country, but to carry the corpses of their kings home. And as the attendants of Agesilaus *had not honey* to preserve the body, they embalmed it with melted wax, and in this way conveyed it to Lacedæmon.”

Whether the practice of embalming with honey was learned in Egypt or in some other country is not stated.

It certainly was not the ordinary custom of the Egyptians to preserve their dead in honey, though there are stories of its being occasionally done, as witness the following : —

“ Abdallatif, whom we have so often quoted, gives some additional information about mummies which is well worth noticing.

“ Besides the mummies that were found in wood and stone coffins, he speaks of others found in vessels of honey.

“ ‘ A man of veracity,’ says the Doctor, ‘ assured me that he and his friends, while looking for treasures near the pyramids, found a vessel well sealed, which they opened and discovered to contain honey. While they were tasting it, one of them remarked a hair that stuck to his finger ; he pulled it and they saw a child appear, with all its limbs adhering together, its body quite fresh and ornamented with jewels.’ ”

Turning from this rather ghastly pot of honey to that most delightful of ancient historians, Herodotus, we listen

with interest to his description of a part of the ceremony by which sacrifices were prepared in Egypt:—

“When they have flayed their steer they pray, and when their prayer is ended, they take the paunch of the animal out entire, leaving the intestines and the fat inside the body; they then cut off the legs, the end of the loins, the shoulders, and the neck; and having so done, they fill the body of the steer with clean bread, honey, raisins, figs, frankincense, myrrh, and other aromatics. Thus filled they burn the body, pouring over it great quantities of oil.”

We also hear from the same author of four wax figures that were put into a body that was being embalmed.

Wax was used for embalming purposes in different parts of the East, and Herodotus tells us the following:—

When a king of Scythia dies “they dig a large square hole in the ground; and having prepared this, they take up the corpse, having the body covered with wax, the belly opened and cleaned, filled with bruised cypress, incense, and parsley and anise-seed, and then sewn up again, and carry it in a chariot to another nation.”

To-day, as of old, Egypt prizes her bees, and we learn that—

“Bees are kept in Egypt, and their honey is much prized by the inhabitants, who usually eat it in a clarified state. It is inferior to that of England, and also to the famous Greek honey.”

Arabia, with her wonderful “Nights,” her gardens full of flowers, and her ever-recurring references to “sweet-meats,” was well acquainted with the bee and made much use of its honey, but scant praise does the honey-maker itself receive from the chroniclers of that land of delights,—the home of Aladdin and the Afrits.

The murmur of the bee does not make musical the literature of Arabia. Where references occur they are almost

always to the honey instead of to the bee, and are usually in a moralizing rather than a poetical vein, as in the following we are informed that —

“He falls more easily than flies fall into honey;” and again: “The lazy is not fed on honey.”

The following, though more elaborate, is equally moralizing: —

“Nor want, nor weakness still conspires
To bind us to a sordid state;
The fly that with a touch expires
Sips honey from the royal plate.”

In the “Assemblies of Al Hariri” we read the following description of a false friend given by the queer old reprobate philosopher, Abû Zayd: —

“I had a neighbor whose tongue cajoled, while his heart was a scorpion; whose speech was a honey-comb to refresh, while his hidden thought was a concentrated venom.”

In Firdusi’s “Epic of Kings,” where Zal, the king’s son, falls in love with Rudabeh, daughter of the accursed Serpent race, we learn that the attendants did not dare speak, —

“For there was none of them that listed to mingle poison in the honey of this love.”

Again, the Turkish army having been defeated, the son of the defeated king blames his father for having undertaken the war, as the Persian army was so strong, —

“For the world is not delivered of the race of Irij, and the noxious poison hath not been converted into honey.”

From the “Divan” of Hafiz we get the following: —

“At her tyranny, I grieve not. For, without the thorn,
The rose, none obtaineth; without the sting, the honey.”

This is a favorite idea with the poets of many nations, and Hafiz again uses it in one of his odes: —

"At harshness I have ceased to grieve, for none to light can bring
A rose that is apart from thorns, or honey void of sting."

We miss in all this that simple joy in the flowers and bees that makes the Hindu literature so charming, and yet the saying of the Bedouins, when they wish to describe a region or a kingdom blessed by nature, that its inhabitant "sleeps with his mouth at a honey bottle," is sufficient proof of the estimation in which honey was held. And travellers tell us that to-day the Arab offers his guest a bowl of milk and a honeycomb for refreshment.

In the "Koran" too the sixteenth chapter is entitled "The Bee," and in it occurs the following address made by God to the bee, this creature being honored above all others by a direct command from the Lord:—

"The Lord spoke by inspiration with the bee, saying, 'Provide thee houses in the mountains and in the trees, and of those materials wherewith men build hives for thee; then eat of every kind of fruit, and walk in the beaten paths of thy Lord.' There proceedeth from their bellies a liquor of various colors, wherein is a medicine for men. Verily here is a sign unto people who consider."

In the rose gardens of Persia, we miss the murmur of the bee as we miss it in Arabia. In Saadi's "Gulistan," or "Rose Garden," where from the name one anticipates all delight of flower and insect life, one finds the roses are rather ornaments of the mind, and the bee does not appear among these dignified blossoms excepting as an instrument to point a moral, as for instance:—

"A learned man without practice is a bee without honey."

And again, —

"Of honey hath the sire a plenteous store;

But the son's feverish and must not have more."

which, we are told, being interpreted means, "Our Heavenly

Father has store of blessings ; but man needs chastisement rather than indulgence."

The Persian sun god, Mithra, symbolizing the creative force in nature, is sometimes represented accompanied by bees ; in some instances a bee is seen issuing from his mouth ; and honey is used in the mysteries of Mithra by the priests of all degrees. The hands of novices are washed in honey mingled with water, by which they are purified, and the hands of those in the highest degree of the order are washed in pure honey. The bull and the lion, so often occurring in the solar myths of Mithra and the bee, give a hint of the wide-spread belief of the origin of the bees from the body of a slain bull.

In spite of the neglect suffered by the bee in Persian literature, we know that even to this day honey is valued in Persia, and that few of the villages are without their basket hives which yield a delicate and delicious honey.

Concerning the habit imputed to Persia of embalming her dead in the products of the bee, Herodotus tells us :

"The Persians cover a body with wax and then place it in the ground ;" and Strabo says their mode of burial is to smear the bodies over with wax, and then to inter them. Again he says of the Assyrians, in reference to their having many rites in common with the Persians, that they put their dead in honey, after having smeared them with wax.

"That the ancient Persians embalmed the bodies of their great men is believed by competent judges, and a Persian writer says that the substance called artificial mummy is found in those stone vessels in which the bodies of great men were preserved by means of honey."

China, like Persia, ignores the bees, not only in her love-songs, but in her literature generally, although she is the "flowery kingdom" and all her literature is abloom with

her cherry blossoms, her plums, and her beautiful gardens, which to this day are the admiration of all who visit her. But she has not the Hindu love for the murmuring bees with their "ecstatic songs" and their nectar-inebriated happiness.

The bee was sacred to "Diana of the Ephesians," whose magnificent temple at Ephesus was one of the seven wonders of the world. Her priestesses were called "bees," and the chief priest was "the king bee."

This "Diana," or Atargatis, as she was called by the Ephesians, was of Babylonian origin. She was the goddess of war and of love, and is represented in her later form with many breasts, — a frank expression of the creative principle with which the bee is so often found associated.

"The bee is employed on Hittite gems, and a gem found near Aleppo represents Atargatis standing on the insect."

Nymphs in the form of bees are said to have revealed to the Ephesians the site for their city.

Of Eastern peoples the Hebrews next to the Hindus recognize the bee in literature. In the "Talmud" we find in the chapter of the "Fives" the following reference to honey, which, though forming but a small proportion of the heaven-sent manna, is not wholly excluded: —

"Five things have in them a sixtieth part of five other things: fire, honey, the Sabbath, sleep, and dreams. Fire is a sixtieth of hell, honey a sixtieth of manna, the Sabbath a sixtieth of the rest in the world to come, sleep the sixtieth of death, and a dream the sixtieth of prophecy."

But it is in the Bible that we find the dramatic and poetical possibilities of the bee most fully appreciated.

Moses, addressing the children of Israel, rehearses to them

their defeat by the Amorites because they went to war against the command of God.

"And the Amorites, which dwelt in that mountain, came out against you and chased you, as bees do, and destroyed you in Seir, even unto Hormah."

We have already heard of the bees attacking and defeating armies and depopulating villages in the East, and no doubt the sting of the tropical bee is a matter to put armies to rout.

In the beautiful imagery of the Psalms, the bee is likened to hostile nations.

"All nations compassed me about : but in the name of the Lord will I destroy them.

"They compassed me about ; yea, they compassed me about : but in the name of the Lord I will destroy them.

"They compassed me about like bees ; they are quenched as the fire of thorns : for in the name of the Lord I will destroy them."

The Hebrews, like the Hindus, believed that honey bestowed knowledge, as is shown in the following verse :

"Butter and honey shall he eat, that he may know to refuse the evil and choose the good."

The high regard in which honey was held is well expressed in the following : —

"My son, eat thou honey, because it is good ; and the honeycomb, which is sweet to thy taste : so shall the knowledge of wisdom be unto the soul."

Concerning prophecy and honey, of which we hear so much in the Greek and Latin myths, we have in Hebrew the prophetess Deborah, who foretold the downfall of Sisera, Deborah in Hebrew meaning "a bee."

The word of God is compared to honey in the Psalm where David exclaims : —

"How sweet are thy words unto my taste ! Yea, sweeter than honey to my mouth."

And again, —

“The judgments of the Lord are true and righteous altogether. More to be desired are they than gold, yea, than much fine gold : sweeter also than honey and the honey-comb.”

In Proverbs we are told, “Pleasant words are as honey-comb, sweet to the soul, and health to the bones.”

Jacob, sending his sons to Egypt to buy food, enjoins them to gain the favor of the governor by taking him a present :

“Take of the best fruits of the land in your vessels, and carry down the man a present, a little balm and a little honey, spices and myrrh, nuts and almonds.”

Thus is clearly shown that honey was considered one of the choice gifts of the land, as again, in the Book of the Kings, where Jeroboam sends his wife to the prophet he bids her : —

“And take with thee ten loaves, and cracknels, and a cruse of honey, and go to him.”

Honey too was one of the gifts brought to David’s army as he was encamped in the wilderness.

The manna gathered by the Children of Israel in the wilderness was delicious to the hungry people, “and the taste of it was like wafers made with honey.”

The Children of Israel brought as an offering to the temples of the Lord, “in abundance, the first-fruits of corn, wine and oil, and honey.”

Honey, however, could not be used in sacrifices for it is commanded : —

“Ye shall burn no leaven nor any honey in any offering of the Lord made by fire.”

It has been by some explained that honey was prohibited as a burnt-offering because it, like leaven, caused fermentation to take place when mixed with flour ; and again, the heathen used honey in their sacrifices, a valid

reason for its prohibition by the Hebrews. Moreover, honey was sometimes used as a symbol for carnal pleasure, and bees are classed as "unclean" animals, that is, it is indirectly forbidden to eat them.

But while honey may not be used as a burnt-offering, it is very acceptable as an offering of first-fruits because these were not sacrificed, but went to the nourishment of the priests.

The punishment of the wicked is that "he shall not see the rivers, the floods, the brooks, of honey and butter."

Honey, in Palestine as in India, was found in clefts in the rocks and in the trunks of trees, and honey in the rock is more than once referred to in the Bible, as in the Psalm where the Lord complains of the disobedience of the Children of Israel, and declares what he would have done for them had they deserved it : —

"He [Jehovah] should have fed them also with the finest of the wheat : and with honey out of the rock should I have satisfied thee."

The Lord thus addresses Jerusalem : —

"Thus wast thou decked with gold and silver, and thy raiment was of fine linen, and silk, and brodered work ; thou didst eat fine flour, and honey, and oil ; and thou wast exceeding beautiful, and thou didst prosper into a kingdom."

And blames the people for setting up images : —

"My meat also which I gave thee, fine flour and oil and honey wherewith I fed thee, thou hast even set it before them for a sweet savour."

The Lord, describing Tyrus, says : "Judah, and the lamb of Israel, they were thy merchants ; they traded in thy market wheat of Minnith and Pannag, and honey, and oil, and balm."

In the Book of the Judges we read how Samson found the honey in the carcass of the young lion he had himself

slain. It is not stated that the bees had their origin in the dead body of the lion, though if that is meant we have here a trace of the superstition believed by the Greeks and by them referred to Egypt, that the bee comes from the body of a slain bull.

In Samson's case the finding of honey and subsequent expounding of his riddle, "Out of the eater came forth meat, and out of the strong came forth sweetness," was fraught with direful consequences, resulting as it did in the slaying of thirty men.

Palestine is frequently referred to as a land flowing with milk and honey. In this way is expressed its extreme fertility and desirability as a place of abode, and it reminds us of the Arabic figure of fertility, — a man with his mouth to a honey-bottle.

The "chosen people" were frequently fed upon honey, and thus did the Lord provide for Jacob : —

"He made him ride on the high places of the earth, that he might eat the increase of the fields ; and he made him to suck honey out of the rock, and oil out of the flinty rock."

The food of John the Baptist while sojourning in the wilderness was locusts and wild honey, quite an epicurean diet could one but overcome an unreasonable occidental prejudice against "locusts."

When Christ had risen from the dead he appeared to his disciples and asked for food.

"And they gave him a piece of a broiled fish, and of an honey-comb. And he took it and did eat before them."

In the mystical language of the Revelation we read the following : —

"And I went unto the angel and said unto him, 'Give me the little book.' And he said unto me, 'Take it and

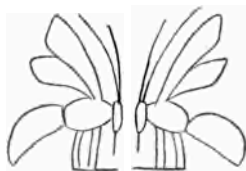
eat it up ; and it shall make thy belly bitter, but it shall be in thy mouth sweet as honey.'

"And I took the little book out of the angel's hand, and ate it up ; and it was in my mouth sweet as honey."

The following is a description of Palestine by a Sanebat from Egypt, the time supposed to be some 2500 years B. C. :

"There were figs and grapes ; its wine was more plentiful than water ; abundant was its honey, many were its oil-trees, and all fruits were upon its trees ; there, too, was barley and spelt, and cattle of all kinds without end."

Palestine may be less of a garden than in those days, still, flowers and bees abound there, and the bees of the Holy Land are said to be a race distinct by themselves. Their near relation, the Syrian bees, whose home is north of Mount Carmel, have been brought to this country, where they have won the favor of the bee-keepers, who consider them among the best that have been imported to enrich our apiaries.



XVI

IN GREECE AND ITALY

It is to be noted that Greek literature treats mainly of the product of the bee rather than, as in India, of the bee itself; although in Greek mythology, as will be seen, the bee also occupies an indispensable place.

The honey of Hymettus is the most famous honey in the world.

It is, as Burroughs says, the classical honey of antiquity — only sharing the honor with the honey of Hybla and of Mount Ida.

Mount Hymettus is in Attica, not far from Athens, and the splendor of that ancient capital was reflected upon the neighboring thyme-covered mountain, illuminating its golden-banded bees as they gathered storied honey for the poets.

It is not in Attic Hymettus, however, that the bees had their origin. That honor belongs to the neighboring island of Crete, where the race of bees is fabled to have been born in a cavern in a high and all but inaccessible wall of rock on Mount Ida.

These bees were born to a great end, no less a one than the nourishing of Zeus, the father of the gods.

Kronos devoured his children as soon as they were born — as he still does all the children of earth — and when Zeus came into the world his mother Rhea, desiring to save his life, hid him away from his unnatural father on the island of Crete, where in a holy grotto she bore him, and

where the bees and the goat Amalthea shared the honor of acting as nurses to the young deity, feeding him on milk and honey.

The Cretans, famous makers of bronze weapons, in order to drown the cries of the infant god and prevent his discovery by a relentless father, instituted their renowned and noisy weapon-dance and performed it about him.

For centuries the birth of the father of the gods among the friendly Cretans was celebrated by the weapon-dance at the observance of the festivals of Zeus. Moreover, in a certain grotto on Mount Ida, for ages there dwelt a band of copper-colored and very fierce bees, that successfully defended their store of holy honey from the approach alike of men and gods.

Yearly, upon the birthday of Zeus, a great fire was to be seen flaming out of the grotto, and Zeus himself watched over the little nurses of his infancy, punishing all who ventured to intrude upon them.

It once happened that four venturesome spirits thought to defy the power of the god and possess themselves of the holy honey, and to this end clad themselves from head to foot in close-fitting bronze armor and proceeded to scale the rocky wall.

But they had reckoned without their Zeus. The armor fell asunder from their bodies, Zeus thundered and drew forth his lightning, but the Fates and Themis held him back, for it was not decreed that any should die — though the angry god turned the sacrilegious four into birds.

It is said the bees received as reward from the grateful god the art of storing honey in waxen cells for winter use, the power to form a community governed by wise laws, and also the beautiful golden bands on their bodies, as a mark of special favor.

Zeus, in ancient works of art, is often represented as

accompanied by bees, which usually are near him upon the horn of plenty.

The oak-tree, sacred to the father of the gods, is also related to the bees, and in a somewhat curious manner. Because the bees fed Zeus, the tree dedicated to him returns honey to them.

At certain seasons the leaves of the oak are covered with honey-dew, believed by the ancients, as we know, to be an ethereal downfall from heaven, and from this circumstance came the saying, "Zeus rains honey."

Hesiod tells us, referring, doubtless, to swarms of bees living in hollow oaks : —

" Nor scythe nor famine on the righteous prey ;
Feasts, strewn by earth, employ their easy day ;
The oak is on their hills ; the topmost tree
Bears the rich acorn, and the trunk the bee."

During the golden age, when all were happy and all had enough, honey was, as it still is, distilled from the leaves of plants, particularly from oaks, and was frequently noticed by the ancient writers. Ovid, in his "Metamorphoses," thus refers to that blessed time : —

" With milk and nectar were the rivers filled,
And Honey from green Holly-okes distilled."

Virgil, promising the return of the golden age at the birth of a certain youth, gives the following beautiful description of the earth at that fortunate time : —

"The very cradle shall pour thee forth attractive flowers. The serpent also shall die ; and the poison's fallacious plant shall die ; the Assyrian spikenard shall grow in every soil. But soon as thou shalt be able to read the praises of heroes, and the achievements of thy sire, and to understand what virtue is, the field shall by degrees grow yellow with soft ears of corn ; blushing grapes shall hang on the rude brambles, and hard oaks shall distil the dewy honey."

Strabo in his travels seems to have discovered favored lands where the golden age still lingered, though it is to be feared a vivid imagination helped color the picture.

He tells us, —

“ Hyrcania is very fertile, and extensive, consisting for the most part of plains, and has considerable cities dispersed throughout it. . . .

“ The following facts are narrated as indications of the fertility of the country. The vine produces a metretes of wine ; the fig-tree sixty medimni of fruit ; the corn grows from the seed which falls out of the stalk ; bees make their hives in the trees, and honey drops from among the leaves.

“ This is the case also in the territory of Matiane in Media, and in the Sacasene, and Araxene of Armenia.”

The bees continued to find joy in the oaks even after the golden age had passed, and Virgil sings thus of an enticing spot, in his description of a poetical contest between the shepherds Thyrsis and Corydon : —

“ Here Mincius hath fringed the verdant banks with tender reed, and from the sacred oak swarms of bees resound.”

The story of the bees on Mount Ida is not the only account given of their origin, for it is said that Melissa, a very beautiful woman, was transformed into a bee by Zeus, and that from her the bees received their classical name of Melissa.

Euhemerus, according to Columella, says that bees were bred from hornets and the sun, and were educated by certain nymphs to become nurses of the young Zeus, and that later the god gave them power to collect and store up for themselves the same food they had provided for him in his infancy. Still others say that Amalthea and Melissa were the two daughters of Melisseus, king of Crete, and that they took care of the young god, feeding him upon goat's-milk and honey.

Others again deny to Crete the honor of having produced the bees at all, and say they came forth in Thessaly, or on Mount Hymettus itself.

Nymphs and bees were very closely related, — nymphs, in fact, being but transformed bees ; and we sometimes find the bees under their protection, as is told in the “Odyssey” in a description of a port in Ithaca : —

“ An olive tree
With spreading branches at the farther end
Of that fair haven stands, and overbrows
A pleasant shady grotto of the nymphs
Called Naiads. Cups and jars of stone are ranged
Within, and bees lay up their honey there.”

As in Hindu mythology, so in that of Greece and Italy, we find the bee intimately connected with the creative force in nature.

Cybele, or Rhea, the great Earth-mother, is, like Vishnu, though to a less extent, the creator of living things, and like him she is often represented in company with bees. Her priestesses were termed *melissæ*, they being, according to some accounts, actually transformed bees.

Demeter, or Ceres, symbolized the earth's fertility, while her daughter, Persephone, or Proserpine, symbolized one aspect of that fertility, the springing forth of verdure in summer and its disappearance in winter ; and of them Porphyry says : —

“The priestesses of Ceres, also, as being initiated into the mysteries of the terrene goddess, were called by the ancients bees ; and Proserpine herself was denominated by them *honied*.”

To both Ceres and Proserpine honey was offered at sacrifices.

Virgil, exhorting the husbandmen to prepare for the coming of the fruitful season, says, —

"Above all, venerate the gods; and renew to great Ceres the sacred annual rites, offering up thy sacrifices upon the joyous turf, at the expiration of the last days of winter, when the spring is serene. . . . For thee let all the rural youths adore Ceres; to whom mix thou the honey-comb with milk and gentle wine."

This libation of honey, milk, and wine was poured upon the sacrifice, the victim having first been led around the fields.

The worship of Ceres in one form or another was very wide-spread.

We are told that once her priestess Melissa, because she would not reveal the secrets she had been set to guard, was torn to pieces by the other women, but that Ceres caused bees to issue from her body; the coming forth of bees from a dead body being a common expression of the immortality of the soul in the early ages.

The bee was sacred to the Greek Artemis, known in Italy as Diana, and who also was symbolical of the creative power, presiding over births, and receiving offerings of honey. Diana was the goddess of the moon as well, and Porphyry tells us:—

"The moon, likewise, who presides over generation, was called by the ancients a bee."

The souls of the dead were supposed to come down from the moon upon the earth in the forms of bees, reminding us of the ancient Hindu faith concerning honey, the bee, and the moon.

The transmigration of the souls of the deserving into the bodies of bees was a Greek, as well as a Hindu myth, the origin of which Porphyry perhaps explains in his "Cave of the Nymphs," where he tells us:—

"All souls, however, proceeding into generation, are not simply called bees, but those who will live in it justly, and

who, after having performed such things as are acceptable to the gods, will again return to their kindred stars. For this insect loves to return to the places from whence it first came, and is eminently just and sober. Whence, also, the libations which are made with honey are called sober."

Porphyry, in a quotation from Sophocles, expresses the belief that the souls of the departed escaped in the form of bees, —

"In swarms while wandering from the dead,
A humming sound is heard."

The bees are also related to the sun god, and the priestesses of Apollo are called *Melissæ*, the pythoness herself being termed by Pindar the bee of Delphi, in one of his Pythian odes : —

"O blest son of Polymnestes, thee, agreeably to this prediction, the oracle hath ennobled by the spontaneous voice of the Delphic bee ; which, having three times bid thee hail, proclaimed thee destined King of Cyrene, when thou wast inquiring what help for impeded speech there shall be from the gods."

One of the oldest temples built to Apollo was constructed by the bees, according to Pausanias, who thus tells the story :—

"Many things, indeed, are reported of the Delphi, and particularly concerning the oracle of Apollo. For they say that this oracle is the most ancient of any on the earth."

There were three temples raised to Apollo, one of brass, one of branches of the laurel-tree, the third, says Pausanias, "was raised by bees from wax and wings, and was sent by Apollo to the Hyperboreans."

Aristæus, the father of bee-culture, was the son of Apollo, and an offering was brought to Apollo as the god of the bees on the 24th of July.

Aristæus was born to Apollo by the river nymph Cyrene, and was initiated into the mysteries of bee-keeping by no less a one than Ceres herself. It was he who taught the art to mankind.

It was he, too, who discovered the method — said to have originated with the Egyptians — of procreating bees from dead cattle, thus replacing his lost swarms. Virgil tells the story of the renewal of Aristæus' bees in his fourth "Georgic."

Having lost them through disease and famine, Aristæus appealed to his mother Cyrene for aid, and visited her in her dwelling under the river Peneus.

She sent him to Proteus, of many forms, whose wisdom could only be evoked when, in spite of his quick transformations into frightful shapes, he had been captured and securely bound.

Aristæus subdued Proteus and learned, in consequence, that the loss of his bees was a punishment for an offence he had committed against Eurydice, unwittingly causing her death and arousing the vengeance of Orpheus and the wood nymphs.

When Aristæus returned with this information to Cyrene, she told him what he must do to regain his bees.

It is the old story, supposed to have come from Egypt, of the birth of bees from the carcass of a sacrificed bull.

Virgil causes Cyrene thus to speak : —

"Single out four choice bulls of beauteous form, which now graze for you on the tops of green Lycæus ; and as many heifers whose necks are untouched by the yoke. For these erect four altars at the lofty temples of the goddesses ; from their throats emit the sacred blood, and leave the bodies of the cattle in the leafy grove.

"Afterwards, when the ninth moon has displayed her rising beams, you may offer Lethæan poppies as the funeral

rites to Orphæus, venerate appeased Eurydice with a slain calf, sacrifice a black ewe, and revisit the grove."

Aristæus did all these things, and when the appointed time came revisited his sacrifices.

"But here they beheld a sudden prodigy, and wonderful to relate ; bees through all the belly hum amidst the decomposed bowels of the cattle, pour forth with the fermenting juices from the burst sides, and in immense clouds roll along ; then swarm together on the top of a tree, and hang down in a cluster from the bending boughs."

The legends of Aristæus were spread far and wide through many countries, and the belief of the springing of bees from the carcass of a dead animal was also widespread ; in later years it penetrated even to England and came over to America, so that at the present time there are those living who, if they do not believe the story, yet repeat it with a puzzled feeling as not quite daring wholly to discredit it.

There is no doubt, as has been said, that the story is symbolical of the renewal of life upon earth, and of the springing of life from apparently dead matter, or the resurrection of the soul after death.

The bee, symbolizing the spirit or soul of man which at death escapes from the body, was believed to be immortal.

Virgil thus refers to the belief in the immortality of the bee : —

"Some have alleged that a portion of the divine mind, and a heavenly emanation, may be discovered in bees ; for that the Deity pervades the whole earth, the tracts of sea, and depth of heaven ; that hence the flocks, the herds, men, and all the race of beasts, each at its birth, derive their slender lives. Accordingly, they affirm that all of them, when dissolved, return and are brought back thither here-

after ; nor is there any room for death ; but that they mount up alive each into his proper order of star, and take their seat in the high heaven."

Some have interpreted the resurrection of Glaukos in the legend as due to his having been buried in honey.

Glaukos, a son of the Cretan king Minos, while playing with a mouse, the symbol of death, once fell into a cask of honey. Minos long sought his unfortunate child, but in vain until he appealed to the oracle, who informed him that he who was best able to draw a comparison from a three-colored cow in Minos's herd would restore his son. Minos therefore appealed to the seer Polyidos, from the family of the renowned soothsayer Melampus. Polyidos likened the colors of the cow to the fruit of the bramble, which is green, red, and black during the various stages of its ripening. Upon this Glaukos was discovered — but he was dead. Minos now demanded that he should be restored to life, and shut up the seer in a vault with the body. Presently a snake crawled towards Glaukos, and Polyidos killed it. Then came another snake, bearing an herb, with which it covered the dead snake, which at once came to life again. Polyidos laid the same herb upon the body of Glaukos and he stood up from his bier.

Democritus promised resurrection of the body if it was preserved in honey.

The power possessed by honey of preserving organic bodies immersed in it was well known to the ancients, and no doubt this was the origin of many of the superstitions regarding the miraculous powers ascribed to it. We know that even human bodies can be and doubtless have been preserved in honey and that the Greeks sometimes used it for this purpose, as Plutarch tells us of the body of Agesilaus, and as Josephus also relates concerning the body of Aristobulus. This general, having been freed from his ene-

mies and sent to Syria by Cæsar in command of forces, was poisoned by Pompey's followers.

"His dead body also lay for a long time embalmed in honey, till Anthony afterwards sent it to Judæa, and caused it to be buried in the royal sepulchres."

There is a Mohammedan legend to the effect that the body of Alexander the Great was placed in a golden coffin filled with honey.

The habits of the bee, as well as its remarkable products, no doubt helped establish its high place in the minds of the people. In contrast to the belief in the story of the carcass, Aristotle tells us the bee approaches nothing that is putrid, only sweet things; and from the earliest time there has been a belief in the purity of the bee that has given an added value to its honey and wax, particularly in religious ceremonials.

In Oriental countries honey very often constituted a part of the first food of children, and in its capacity of providing nourishment became quite naturally symbolical of the nurse or the mother, and hence doubtless one reason for its constant relation to those divinities connected with procreation.

Dionysos, or Bacchus, in his earlier form was a most beneficent god, also symbolizing that force in nature which rises into new life after the sleep of death, or the coming of spring after winter. He was the bearer of high inspiration to man, freeing him from sordid and petty cares.

According to Ovid it was Bacchus who first discovered honey. As he moved through the woods of the Thessalian mountains Rhodope and Pangæa, accompanied by his train of followers making the air resound with their music, the birds flew near overcome by curiosity, and with them the hitherto unknown bees.

Bacchus caught the pretty creatures that were thus fruitlessly flying about, and shut them up in a hollow tree.

Upon this they settled down into communal life and made honey for him.

This honey was deservedly popular, and no wonder pleasure-loving Silenus was seduced by it.

One day he stole into the woods determined to taste it. He found the tree, stood on his donkey, and stretched his short body until he was standing on tiptoe almost within reach of the prize. But the bees flew angrily out and stung him on his bald pate, whereupon he fell backward upon his donkey, which, being a sharer in the stings of course, — as was poor Silenus' frequent experience in similar situations, — kicked him, and in sad plight he was found lying on the ground by the Satyrs whom he called to his assistance, and who as usual made sport of his misfortune.

Dionysos had good reason to befriend the bees, for, like his father Zeus, he was nourished in infancy on honey.

Dionysos was the son of Zeus and Semele, and his mother, having insisted upon beholding her husband Zeus in all his glory, was punished for her folly by dying at sight of the thunderer's brilliancy. The babe was saved from the fierce glow by Hermes and afterwards given by Zeus to the care of Makris, or, as some call her, Brisa, the daughter of Aristæus, to which story Apollonius Rhodius thus refers in "Medea's Wedding": —

"At once they mixed a bowl for the blessed gods, as was right, and dragged sheep to the altar with pious hands, and made ready that very night for the maiden her bridal bed in the holy cave, where Makris once did dwell, the daughter of Aristæus, the bee-keeper, who discovered the use of honey and the fatness of the olive, prize of toil. She it was, that at the first took to her breast the Nysean son of Zeus in Eubœa, home of the Abantes, and with honey she moistened his parched lips when Hermes brought him from out the fire."

Makris, or Brisa, taught Bacchus to press the honey from the honey-comb.

In the Dionysian temple, upon the Lesbian promontory Brisa, Bacchus was worshipped as Bacchus Brisæus, the god of sweetness, the honey-god.

Bacchus, as the distributor of flowers over the meadows, easily became the father of the bees, or the creator of honey, — an honor, however, that he shared with others.

Euripides sings thus of Dionysos : —

“To Phrygia’s steeps, to Lydia’s ridges high
He leads, exulting leads his train,
While Evøe, Evøe, is the joyful cry,
And as they pass, through every plain
Flows milk, flows wine, the nectar’d honey flows,
And round each soft gale Syrian odors throws.”

The priestesses of Dionysos brandished in their hands the thyrsos, a cane with a crown of ivy, and as Euripides tells us, —

“— the ivy wands
Distilled from all their tops rich store of honey.”

Honey is known to possess a sleep-producing power, and consequently was used as an offering to death, sleep to the ancients being a symbol of death. Beside the body on the bier was placed, in Homeric times, a vessel of honey, as the “Iliad” tells us was done at the burial of Patroclus. Achilles prepared the sacrifices, placing them about the body upon the funeral pyre.

“And he set therein two-handled jars of honey and oil, leaning them against the bier.”

It was the custom of the survivors to pour honey upon the graves of their beloved dead, and the shepherds of Lokris were wont to smear the grave of Hesiod with honey, as we learn from an inscription on the poet attributed to Alcæus, which runs thus:—

"Nymphs in their founts, 'midst Locris' woodland gloom,
Laved Hesiod's corse, and piled his grassy tomb.
The shepherds there the yellow honey shed,
And milk of goats was sprinkled o'er his head."

To the underworld deities, to Hades and Hekate, as well as to the spirits of the dead, honey was offered, as Æschylus describes in his tragedy of "The Persians."

Atossa, the queen mother, having had her ill-omened dreams confirmed by news of the defeat of the Persian army under her son Xerxes, brings libations for her dead husband, Darius, and says :—

"I return, and bear
Libations soothing to the father's shade
In the son's cause ; delicious milk, that foams
White from the sacred heifer ; liquid honey,
Extract of flow'rs."

Euripides also in his "Iphigenia in Tauris" speaks of honey libations to the dead, where Iphigenia, lamenting the death of her brother, says :—

"For him, as dead, with pious care
This goblet I prepare ;
And on the bosom of the earth shall flow
Streams from the heifer mountain-bred,
The grape's rich juice, and mix'd with these,
The labor of the yellow bees,
Libations soothing to the dead.
Give me the oblation : let me hold
The foaming goblet's hallowed gold."

In one of Lucian's comedies Charon comes from the underworld to view things and people in the world above, and Mercury conducts him about. Charon asks to see the sepulchres where dead bodies are inhumed, and when Mercury shows him the cemeteries, the ancient ferryman of Hades is puzzled at the wasted mead he sees poured out in honor of the dead, — mead, or metheglin, as it is also

called, being, as we know, a fermented drink made from honey and frequently used in libations.

“Charon. Why, then, crown they
These stones, and why with unguent rich anoint them?
And why do some, heaping a funeral pile
Before the mounds, and digging out a trench,
Burn sumptuous viands there, and in the ditches
Pour, if I right conjecture, mead and wine?

“Mercury. I know not, ferryman, what use it can be
To those in Hades; but it is believed
That souls returning from the world below
Will come to supper — very probable!
Hovering above the savor and the smoke,
And from the trench will drink up the metheglin.”

Needless to say, Lucian was more faithful as a chronicler of ancient customs than as a believer in them.

In the “Odyssey” Circe directs Ulysses on his way to Pluto’s realm, there to consult the mighty seer, Tiresias. At the entrance to the abode of the dead two streams meet, and Circe says: —

“At the place where meet
The ever-roaring waters stands a rock;
Draw near to that, and there I bid thee scoop
In earth a trench, a cubit long and wide.
And round about it pour to all the dead
Libations, — milk and honey first, and next
Rich wine, and lastly water, scattering
White meal upon them.”

Honey cakes were offered as a parting gift to the dead, with which to appease Cerberus, and Virgil, in the “Æneid,” tells us how the hero Æneas descended into Hades, conducted by the Sibyl of Cumæ to consult with his father Anchises. With much difficulty Charon, the ferryman conveys his living freight across the river Styx, to where frightful Cerberus lay barking from his triple jaws.

"To whom the prophetess, seeing his neck now bristle with horrid snakes, flings a soporific cake of honey and medicated grain. He, in the mad rage of hunger, opening his three mouths, snatches the offered morsel, and, spread on the ground, relaxes his monstrous limbs, and is extended at vast length over all the cave."

Offerings of honey were made to the household gods, as is illustrated in one of the "Elegies" of Tibullus.

"Or dulcet cakes himself the farmer paid,
When crown'd his wishes by your powerful aid ;
While his fair daughter brought with her from home
The luscious offering of a honey-comb."

In fact, honey forms a part of the sacrifices made to most of the members of the Greek and Latin pantheon, a supposed cause, as we remember, of its prohibition as a sacrifice by the Hebrews.

Particularly to the gods and goddesses of the fields and gardens was honey a necessary offering, for it formed, as we shall see later, a very important part of the wealth of the agriculturist, and was a valued article of nutriment.

It continually appears in connection with flour and milk and wine as offerings to the gods, the flour symbolizing the nutrient plant world, the milk the nutrient animal world, and honey the ethereal sweet gift of the gods.

Priapos, the special protector of fields and gardens, received the first-fruits of the field and libations of wine and honey. He was supposed to be the son of Dionysos and Aphrodite ; fertility in plants and animals was ascribed to him, and he protected herds, bee-hives, and fishing nets.

Pan, also the god of the fields, received his share of homage — and honey offerings.

Thus sings the Shepherd Comatas in one of the "Idyls of Theocritus" : —

"Nay, but an if thou wilt come, thou shalt tread here the

soft-feathered fern, and flowering thyme, and beneath thee shall be thrown the skins of she-goats, four times more soft than the fleeces of thy lambs. And I will set out eight bowls of milk for Pan, and eight bowls full of the richest honey-combs."

The Romans are said to have had a special goddess of honey, Mellonia, to whom they made sacrifices.

Cupid does not, like Kāma, bear a bow strung with bees, but we are told that he sometimes dips the golden arrow that incites love in honey, to make the love fortunate, sometimes in gall to make it unfortunate; and Anacreon has used the bee, not to aid Cupid, but to punish the relentless infant, as appears in the following: —

"Cupid once upon a bed
Of roses laid his weary head;
Luckless urchin, not to see
Within the leaves a slumbering bee!
The bee awaked — with anger wild
The bee awaked, and stung the child.
Loud and piteous are his cries;
To Venus quick he runs, he flies!
"Oh, mother! — I am wounded through —
I die with pain — in sooth I do!
Stung by some little angry thing,
Some serpent on a tiny wing —
A bee it was — for once, I know
I heard a rustic call it so."
Thus he spoke, and she the while
Heard him with a soothing smile;
Then said, "My infant, if so much
Thou feel the little wild-bee's touch,
How must the heart, oh, Cupid! be,
The hapless heart that's stung by thee?"

In Lang's translation of the "Idyls of Theocritus" we have a similar story thus rendered:—

"The thievish Love, — a cruel bee once stung him, as

he was rifling honey from the hives, and pricked his fingertips all ; then he was in pain, and blew upon his hand, and leaped, and stamped the ground. And then he showed his hurt to Aphrodite, and made much complaint, how that the bee is a tiny creature, and yet what wounds it deals ! And his mother laughed out, and said, ‘ Art thou not even such a creature as the bees ? — for tiny art thou, but what wounds thou dealest ! ’ ”

There are frequent allusions to Cupid mischievously overturning a bee-hive, and Albert Dürer has given us a most delightful picture of this event, in which Venus appears coming to the rescue of the naughty child.

Moschus, in one of his idyls, causes Venus thus to describe the lost Cupid whom she is trying to find : —

“ The child is most notable ; thou couldst tell him among twenty together ; his skin is not white, but flame colored ; his eyes are keen and burning ; an evil heart and a sweet tongue has he, for his speech and his mind are at variance. Like honey is his voice, but his heart of gall ; all tameless is he, and deceitful, the truth is not in him, a wily brat, and cruel in his pastime.”

Venus too received libations of honey, to which Empedocles thus refers : —

“ Venus was their only queen.
Her they propitiate and duly worship
With pious images, with beauteous figures
Skillfully carved ; with fragrant incenses,
And holy offerings of unmixed myrrh,
And sweetly smelling frankincense ; and many
A pure libation of fresh golden honey
They pour’d along the floor.”

The word “ honey ” or other words derived from it were used as terms of endearment by the ancients, very much as they are used by us to-day. We hear of a “ puer mellitus ”

and a "puella mellita," the classical form of "Honey" so commonly used by our Southern negro when addressing children or beloved adults.

Cupid was also the honey-bird, or honey-bee. There were "eyes as sweet as honey."

And the lover, quite in modern southern United States dialect, addressed his beloved as "my little honey," "my honey," "my honied one."

Cities and districts were also frequently named from honey, as Melitonus in Pontus, Melitaia in Thessaly, Melita in Sicily, Meliteria in Cappadocia, Melitussa in Illyria, and Melissurgis in Macedonia. Melita was also the classical name of Malta.

Some kinds of honey possess an intoxicating quality when used fresh, as well as after being mixed with water and fermented to form the drink called mead, so popular among the Northern nations.

Porphry alludes to intoxicating honey in his "Cave of the Nymphs," where he tells us : —

"In Orpheus, likewise, Saturn is ensnared by Jupiter through honey. For Saturn, being filled with honey, is intoxicated, his senses are darkened, as if from the effects of wine, and he sleeps. The goddess Night, too, in Orpheus, advises Jupiter to make use of honey as an artifice. For she says to him : —

" ' When stretch'd beneath the lofty oak's good view,
Saturn, with honey by the bees produced,
Sunk in ebriety, fast bind the god.' "

And Horace, in his "Ode to Bacchus," says : —

" Give me to sing, by thee inspir'd,
Thy priestesses to madness fir'd :
Fountains of wine shall pour along,
And, melting from the hollow tree,
The golden treasures of the bee,
And streams of milk shall fill the song."

The intoxication induced by honey was in many instances considered a divine frenzy, and it was through eating honey that the powers of prophecy were obtained by the Fates, as Homer, in his "Hymn to Mercury," tells us.

Apollo is addressing Mercury and telling him of the three Fates : —

"From these I have learned true
Vaticinations of remotest things.
My father cared not. Whilst they search out dooms,
They sit apart and feed on honey-combs."

They, having eaten the fresh honey, grow

"Drunk with divine enthusiasm, and utter
With earnest willingness the truth they know,
But, if deprived of that sweet food, they mutter
All plausible delusions ; — these to you
I give ; — if you inquire, they will not stutter ;
Delight your own soul with them ; — any man
You would instruct may profit if he can."

This divine madness seizing the fates through the honey of the bee recalls to mind the Hebrew prophetess Deborah.

In this connection bees, like birds, were augurs of good or ill fortune in the old days of Greece and Italy, and had power to foretell what was about to happen.

A swarm of bees settling on a house foretold a conflagration, which recalls the sacrifices considered necessary by the ancient Hindus when a man's house was made the resting-place of a swarm of bees.

A swarm of bees sometimes foretold misfortune, as in the case of the defeat of Scipio when engaged in war with Hannibal. Livy the historian describes in a graphic manner Hannibal's influence over his troops gained by great promises of what he would give them if they won,

and how they "with one mind and one voice demanded the battle," and then adds : —

"By no means so great an alacrity prevailed among the Romans, who, in addition to other causes, were also alarmed by recent prodigies ; for both a wolf had entered the camp, and having torn those who met him, had escaped unhurt, and a swarm of bees had settled on a tree overhanging the general's tent."

In this case the prophecy of defeat was fulfilled, but it did not always happen so ; as Pliny tells us, —

"Bees settled, too, in the camp of the chieftain Drusus when he gained the brilliant victory of Arbalo ; a proof, indeed, that the conjectures of soothsayers are not by any means infallible, seeing that they are of opinion that this is always of evil augury."

A swarm of bees did not always portend evil, however, for Cicero in his "Essay on Divination" tells the following of Dionysius, King of Syracuse : —

"It was by this kind of conjectural divination that the fortune of the tyrant Dionysius was announced a little before the commencement of his reign ; for when he was travelling through the territory of Leontini he dismounted and drove his horse into a river ; but the horse was carried away by the current, and Dionysius, not being able with all his efforts to extricate him, departed, as Philistus reports, lamenting his loss. Some time afterwards, as he was journeying further down the river, he suddenly heard a neighing, and to his great joy found his horse in very comfortable condition, with a swarm of bees hanging on his mane. And this prodigy intimates the event which took place a few days after this, when Dionysius was called to the throne."

Bees foretold to King Latinus the coming of Æneas to Italy and his settlement there, as Virgil relates : —

"In the centre of the palace, within the deep recesses of the inner court, stood a laurel, with sacred locks, and for many years preserved with awe ; which King Latinus having discovered when he was raising the first towers of his palace, was said to have consecrated to Phœbus, and from it to have given the name of Laurentines to the inhabitants. On the high summit of this tree thick-clustering bees, strange to hear, wafted athwart the liquid sky with a great humming noise, planted themselves ; and, having linked their feet together by a mutual hold, the swarm hung in a surprising manner from the leafy bough. Forthwith, the prophet said, we behold a foreign hero hither advancing, and an army making towards the same parts where the bees alight, from the same parts whence they came, and bearing sway in the lofty palace."

In Lycophron's "Cassandra," Cassandra, daughter of Priam and Hecuba, having received the gift of prophecy from Apollo, repeatedly foretold calamities that were to befall Troy, —

— "for then nor foss, nor earthy mound,
Nor bars, nor bolts, nor massy walls, though flanked
With beetling towers, and rough with palisades,
Aught shall avail ; but (thick as clustering bees,
When sulphurous steams ascend, and sudden flames
Invade their populous cells) down from the banks,
Heaps upon heaps, the dying swarms shall roll,
And temper foreign furrows with their gore !"

Herodotus tells of a prodigy by which the bees gained tardy but earnest recognition for a slain leader from his slayers. Onesilus the Salaminian was killed in an encounter with the Persians.

"Now the Amathusians, having cut off the head of Onesilus because he had besieged them, took it to Amathus, and suspended it over the gates ; and when the head

was suspended, and had become hollow, a swarm of bees entered it, and filled it with honey-comb. When this happened the Amathusians consulted the oracle respecting it, and an answer was given them that they should take down the head and bury it, and sacrifice annually to Onesilus as to a hero; and if they did so, it would turn out better for them. The Amathusians did accordingly, and continued to do so until my time."

The literature and mythology of the ancients contain numerous such stories of prophecy, good or bad, given by the bees.

The sweetness of honey came to be symbolical of the sweetness of speech. As honey was sweet in the mouth, sweet also were the words of the eloquent that proceeded out of the mouth. Hence the expressions "honeyed speech," "honeyed tongue," "his tongue dropped honey," and many others.

Hesiod, for instance, speaking of the gifts bestowed by the Muses upon whomsoever among the kings of men they delight to honor, says, —

"Upon his tongue they shed a balmy dew;
And words, as honey sweet, drop from his lips."

Future greatness and future eloquence are said frequently to have been foretold by bees.

Cicero relates, in his work on divination, the belief concerning Plato: —

"While Plato was an infant in his cradle, a swarm of bees settled on his lips during his slumbers; and the diviners answered that he would become extremely eloquent; and this prediction of his future eloquence was made before he even knew how to speak."

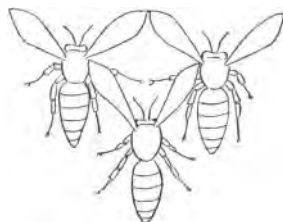
And Pliny says the same thus: "Bees settled upon the lips of Plato when still an infant even, announcing thereby

the sweetness of that persuasive eloquence for which he was so noted."

Xenophon, who was as eloquent as a writer as he was excellent as a leader and a swordsman, was called the Attic Bee.

Sophocles was also called the Attic Bee ; and Pindar, as he lay sleeping, was visited by bees who refreshed the darling of the Muses with delicious honey.

"The divine Homer," too, is said to have received his first nourishment from a priestess whose breasts distilled honey. In short, there are very few of the sweet singers or eloquent pleaders of ancient days whose future renown was not fabled to have been foretold in this way by the bees.



XVII

IN GREECE AND ITALY (*continued*)

THE bee is mentioned in one way or another by nearly all the writers of classical antiquity.

The poets used the bees, after the manner of poets, to beautify their verse, and from Æschylus to Theocritus the bees and their honey grace the pages of the Greek and Roman singers.

Homer compares a great army to a swarm of bees, but his bees are the wild, rock-dwelling tribes, as in the second book of the "Iliad," where Nestor calls to arms the host : —

"So spake he, and led the way forth from the council, and all the other sceptred chiefs rose with him and obeyed the shepherd of the host ; and the people hastened to them. Even as when the tribes of thronging bees issue from some hollow rock, ever in fresh procession, and fly clustering among the flowers of spring, and some on this hand and some on that fly thick ; even so from ships and huts before the low beach marched forth their many tribes by companies to the place of assembly."

In the first book of the "Iliad" honey is used by Homer in the poetical sense so often used by his successors, where he describes Nestor : —

"Then in their midst rose up Nestor, pleasant of speech, the clear-voiced orator of the Pylians, he from whose tongue flowed discourse sweeter than honey."

Hesiod, some eight hundred years B. C., was well acquainted with hive-bees, understood the art of bee-keeping, and was fond of using the drone to point a moral. In his "Works and Days" we learn that —

"Still on the sluggard hungry want attends;
The scorn of man, the hate of Heaven impends;
While he, averse from labor, drags his days,
Yet greedy on the gains of others preys;
E'en as the stingless drones devouring seize
With gluttony the harvest of the bees."

Still more severe is another reference to the drones in which our poet casts a very unchivalrous lance at the fair sex. He tells us that Vulcan fashioned a maid of azure eyes at Jove's behest, because the All-Father, being angry with mankind for having received from Prometheus the heavenly fire, desired to do them an injury, and the greatest injury the mighty intellect of the great god could devise was to give them woman. This first woman, this maid of azure eyes, was of surpassing loveliness, and was adorned by Minerva herself. When she was presented,

"On gods and men in that same moment seized
The ravishment of wonder, when they saw
The deep deceit, the inextricable snare.
From her the sex of tender woman springs:
Pernicious is the race: the woman tribe
Dwell upon earth, a mighty bane to man:
No mates for wasting want, but luxury:
And as, within the close-roof'd hive, the drones,
Co-operative in base and slothful works,
Are pamper'd by the bees, these all the day,
Till sinks the ruddy sun, haste on the wing,
'Their murmuring labors ply,' and still cement
The white and waxen comb; those lurk within
The close hive, gathering in their maw the fruit
Of others' labors; such are womankind:
They, whom the Thunderer sent, a bane to men,
Ill helpmates of intolerable toils."

This sad example has been followed by later writers.

Æschylus, like Homer, used the bees in a simile of the army in his tragedy of "The Persians," where the chorus tells us, —

"For all the host that drive the steed, and that tramp along the plain, hath gone off like a swarm of bees, along with the leader of the army, having crossed the ocean promontory common to both continents, united to either side."

In a fragment of one of the unknown plays of Euripides preserved to us by Athenæus, we meet again the figure for eloquence used by Homer, —

"E'en should the Phrygian God enrich my tongue
With honeyed eloquence, such as erst did fall
From Nestor's or Antenor's lips."

Euripides also gives us the following beautiful description of a meadow in his tragedy "Hippolytus."

Hippolytus enters with his huntsmen, unconscious of the frightful fate Venus has decreed for him because he scorns the joys of love. He is singing in honor of the virgin goddess Artemis, whom alone he worships, —

"For thee this woven garland from a mead
Unsullied have I twined, O Queen, and bring.
There never shepherd dares to feed his flock,
Nor steel of sickle came: only the bee
Roveth the springtide mead undesecrate:
And Reverence watereth it with river-dews.
They which have heritage of self-control
In all things, — not taught, but the pure in heart, —
These, these may gather flowers, but none impure."

Later in the same tragedy the Love Queen appeared, and dire indeed was her coming to the hapless Phædra, who had fallen in love with Hippolytus

— “for dooming
Of death had she blent with the bride-chant’s singing.
For the Dread One breathed on all life, winging
Softly her flight as a bee low humming.”

Virgil, as we know, wrote a “Georgic” upon the bees, and although his treatment of them is less brilliant than that of the Hindu singers, yet he pays them a poet’s homage, not only in the “Georgics” and “Bucolics,” but also in the “Æneid,” where he makes numerous references to them.

Horace too, like his contemporary Virgil, values the bee, and in his “Ode to Septimus” sings the praise of honey and olives. His friend Septimus has gone out to see the world, even as far as Spain, but Horace declares that for himself he hopes always to live by Tiber, but if that may not be he chooses next Galesus, of which he sings, —

“No spot so joyous smiles to me
Of this wide globe’s extended shores ;
Where nor the labors of the bee
Yield to Hymettus’ golden stores,
Nor the green berry of Venafran soil
Swells with a riper flood of fragrant oil.”

Again, Horace, singing of the impossibility of rivalling Pindar, compares the flight of Pindar’s muse to that of his own : —

“Strong is the gale that wafts the swan of Dirce, when-e’er, Antoninus, he spreads his wings into the high spaces of the clouds. I in the mood and manner of a matine bee which culls the pleasant thyme with ceaseless toil about the wood and slopes of dewy Tibur, a tiny minstrel, mould my studied verse.”

Horace prefers a quiet country life to the turmoil of a city, as he frequently tells us : —

“A stream of clear water, and a wood of a few acres, and the unfailing promise of my cornfield, in blessedness of

lot surpass (though he knows it not) him who is splendid in the sway of fruitful Africa. Although for me neither Calabrian bees bring honey, nor wine is mellowing in Læstrygonian jar, nor goodly fleeces grow on Gallic pastures, yet vexing penury is far away, and if I wished for more, you would not refuse to give it to me."

Martial agrees with Horace in preferring the country, and in his epigram to Fronto we read the following : —

"Does any one haunt the porticos of cold variegated Spartan marble, and run to offer, like a fool, his morning greetings, when he might, rich with the spoils of grove and field, unfold before his fire his well-filled nets, and lift the leaping fish with the quivering line, and draw forth the yellow honey from the red cask, while a plump housekeeper loads his unevenly propped table, and his own eggs are cooked by an unbought fire?"

Martial in another of his epigrams describes the young girl Erotien, "whose breath was redolent with odors which rivalled the rose-beds of Pæstum, or the new honey of Attic combs, or amber just rubbed in the hand."

In another of the epigrams occurs the well-known description of the bee enclosed in amber : —

"The bee is enclosed, and shines preserved, in a tear of the sisters of Phaeton, so that it seems enshrined in its own nectar. It has attained a worthy reward for its great toils ; we may suppose that the bee itself would have desired such a death."

While again we read, "The bee that throngs Thesean Hymettus has sent you this noble nectar from the forest of Minerva ;" and again, "If quinces well saturated with Attic honey were placed before you, you would say these honey-apples are delicious."

The honey of Hybla is almost as celebrated as the Attic honey of Hymettus.

Hybla is a name that was given to several cities flourishing at different periods in Sicily, and the thyme-covered hills about these cities yielded the famous honey.

Sicily was finally settled by Greek colonists after having been looked upon in terror for a long time on account of the pirates that were believed to infest it, as Strabo relates. Concerning its final settlement Strabo tells us : —

“Theocles the Athenian, however, having been driven to Sicily by storms, observed both the weakness of the inhabitants and excellence of the soil. On his return home, he was unable to persuade the Athenians to make any attempt, but he collected a numerous band of Chalcidians in Eubœa, with some Ionians and Dorians, whereof the most part were Megarenses, and sailed. The Chalcidians founded Naxos, and the Dorians Megara, which was at first called Hybla. These cities no longer exist, but the name of Hybla survives on account of the Hyblæan honey.”

Virgil in one of his “Bucolics” sings : —

“Galatea, daughter of Nereus, sweeter to me than Hybla’s thyme, whiter than swans, fairer than white ivy ; soon as the well-fed steers shall return to their stalls, come, if thou hast any regard for Corydon.”

And again Virgil sings : —

“On this side, a hedge planted at the adjoining boundary, whose willow blossoms are ever fed on by Hyblæan bees, shall often court you by its gentle hummings to indulge repose.”

“Give me, Diadumenus,” says Martial, “close kisses. ‘How many?’ you say. You bid me count the waves of the ocean, the shells scattered on the shore of the Ægean Sea, the bees that wander on Attic Hybla, or the voices and clapping that resound in the full theatre when the people suddenly see the countenance of the Emperor . . . he wants but few who can count them.”

Concerning the "Attic Hybla," over which the bees in this erotic epigram wander, Martial himself offers an explanation when he says, —

"When you make a present of Sicilian honeycomb from amid the hills of Hybla, you may call them Attic."

This license was probably based upon the fact that the Hyblæan honey did much resemble the Hymettian, and was gathered by a colony of people founded by an Athenian.

In another epigram Martial thus addresses Nævulus :

"Like as flowery Hybla is variegated with many a color, when the Sicilian bees are laying waste the fleeting gifts of spring, so your presses shine with piles of cloaks, your wardrobe glistens with uncounted robes. And your white garments, which the land of Apulia produced from more than one flock, would clothe a whole tribe."

Martial expresses his gratification in the success of his epigrams when writing to Lausus : —

"It is reported (if fame says true) that the beautiful town of Vienna counts the perusal of my works among its pleasures. I am read there by every old man, every youth, and every boy, and by the chaste young matron in presence of her grave husband. This triumph affords me more pleasure than if my verse were recited by those who drink the Nile at its very source, or than if my own Tagus loaded me with Spanish gold, or Hybla and Hymettus fed my bees."

Writing upon the favorite of Domitian, whose name, Earinus, signifies spring, Martial says : —

"You have a name which designates the season of the new-born year, when the Cecropian bees plunder the short-lived vernal flowers."

The honey of Corsica was as renowned for its bad qualities as that of Hybla and Hymettus was for its good, and Martial thus refers to it : —

"He who ventures to send verses to the eloquent Nerva will present common perfumes to Cosmus, violets and privet to the inhabitant of Pæstum, and Corsican honey to the bees of Hybla."

In an epigram to Cæcilianus he also says, —

"You ask for lively epigrams, and propose lifeless subjects. What can I do, Cæcilianus? You expect Hyblæan or Hymethian honey to be produced, and yet offer the Attic bee nothing but Corsican thyme."

In the "Idyls of Theocritus" the bees play a delightful part, and one here feels a slight sense of that comradeship with them which makes the poetry of Kalidasa and his Hindu fellow-poets so charming.

In the "Song of Thyrsis" the shepherd, written by Theocritus, we read : —

"Get thee to Ida, get thee to Anchises! There are oak-trees — here only galingale blows, here sweetly hum the bees about the hives!

"Begin, ye Muses dear, begin the pastoral song!"

Again in the same song: "Come hither, my prince, and take this fair pipe, honey-breathed with wax-stopped joints; and well it fits thy lip: for verily I, even I, by Love am now haled to Hades.

"Give o'er, ye Muses, come, give o'er the pastoral song!"

Upon which the goatherd who had prevailed upon Thyrsis to sing, hands him the cup he had promised as a reward, and says, —

"Filled may thy fair mouth be with honey, Thyrsis, and filled with the honey-comb; and the sweet dried fig mayst thou eat of Ægilus, for thou vanquishest the cicala in song! Lo, here is thy cup, see, my friend, of how pleasant a savor! Thou wilt think it has been dipped in the well-spring of the hours."

A goatherd's song of Amaryllis contains the following:

"Ah, regard my heart's deep sorrow! Ah, would I were that humming bee, and to thy cave might come dipping beneath the fern that hides thee and the ivy leaves!"

Comatos, ordered by Lacon to go with him, replies, —

"That way I will not go! Here be oak-trees, and here the galingale, and sweetly here hum the bees about the hives."

In the song of Simichidas we have the following beautiful description of a rural scene: —

"And high above our heads waved many a poplar, many an elm-tree, while close at hand the sacred water from the nymphs' own cave welled forth with murmurs musical. On shadowy boughs the burnt cicalas kept their chattering toil, far off the little owl cried in the thick thorn brake, the larks and finches were singing, the ring-dove moaned, the yellow bees were flitting about the springs. All breathed the scent of the opulent summer, of the season of fruits; pears at our feet and apples by our sides were rolling plentiful; the tender branches, with wild plums laden, were earthward bowed, and the four-year-old pitch seal was loosened from the mouth of the wine-jars."

Daphnis won the prize for singing among the goatherds.

"So sang the lads, and the goatherd thus bespoke them: "Sweet is thy mouth, O Daphnis, and delectable thy song! Better is it to listen to thy singing than to taste the honeycomb. Take thou the pipe, for thou hast conquered in the singing match.'"

"Cicala to cicala is dear, and ant to ant, and hawks to hawks, but to me the Muse and song. Of song may all my dwelling be full, for sleep is not more sweet, nor sudden spring, nor flowers are more delicious to the bees — so dear to me are the Muses. Whom they look on in happy hour, Circe hath never harmed with her enchanted potion."

In another vein the poet with a gleam of fun causes the herdsman who has been rejected and ridiculed by a city damsel thus to describe himself when indignantly telling his story to his mates:—

“Shepherds, tell me the very truth ; am I not beautiful? Mine eyes were brighter far than the glance of the gray-eyed Athene, my mouth than even pressed milk was sweeter, and from my lips my voice flowed sweeter than honey from the honeycomb.”

In his lament for the poet Bion, Moschus sings,—

“Thy sudden doom, O Bion, Apollo himself lamented, and the Satyrs mourned thee, and the Priapi in sable raiment, and the Panes sorrow for thy song, and the fountain fairies in the wood made moan, and their tears turned to rivers of waters, and Echo in the rocks laments that thou art silent, and no more she mimics thy voice. And in sorrow for thy fall the trees cast down their fruit and all the flowers have faded. From the ewes have flowed no fair milk, nor honey from the hives, nay, it hath perished for mere sorrow in the wax, for now hath thy honey perished, and no more it behoves men to gather the honey of the bees.

“*Begin, ye Sicilian Muses, begin the dirge.*”

Besides the poets' use of the bees we have the more serious writers constantly employing them as emblems of a well-governed state and as symbols of colonization and of social and domestic economy, while the poor drones are everywhere anathematized and held up as examples of all that is pernicious in a community.

Plato, in his great work, “The Republic,” has given to bees an important place in illustrating the needs and ordering of a state, and in one place, in speaking of how the minds of youth are affected by what they hear of vice and virtue, he uses a simile very common in all ages ; he says :

"Those of them, I mean, who are quick-witted, and, like bees on the wing, light on every flower, and out of all they hear, gather inferences as to the character and way of life which are best for them."

Plutarch, in his "Life of Lycurgus," has the following :

"Upon the whole, he taught his citizens to think nothing more disagreeable than to live by or for themselves. Like bees, they acted with one impulse for the public good, and always assembled about their prince."

And again, explaining how Greece was kept in voluntary obedience by her rulers, he says : "Thus bees, when their prince appears, compose their quarrels, and unite in one swarm."

Very much can be said about the use of honey as food among the ancients. With them it was one of the staples of life, as well as a luxury ; and the incomparable book of Athenæus, "The Deipnosophists, or Banquet of the Learned," has preserved for us many quaint and interesting customs of the people during and before his time. From him we learn of the various ways in which honey was served, and of its place in the feast as well as of its importance as a nutrient. Concerning this last he tells us : —

"And it is said that Democritus, the philosopher of Abdera, after he had determined to rid himself of life on account of his extreme old age, and when he had begun to diminish his food day by day, when the day of the Thesmophorian festival came round, and the women of his household besought him not to die during the festival, in order that they might not be debarred from their share in the festivities, was persuaded, and ordered a vessel full of honey to be set near him ; and in this way he lived many days with no other support than honey ; and then some days after, when the honey had been taken away, he

died. But Democritus had always been fond of honey ; and he once answered a man, who asked him how he could live in the enjoyment of the best health, that he might do so if he constantly moistened his inward parts with honey and his outward man with oil. And bread and honey was the chief food of the Pythagoreans, according to the statement of Aristoxenus, who says that those who eat this for breakfast were free from disease all their lives. And Lycus says that the Cyrneans (and they are a people who live near Sardinia) are very long-lived, because they are continually eating honey ; and it is produced in great quantities among them."

The story told by Athenæus of Democritus is told in substance by Pliny of Pollio Romilius, as we have already read.¹

We are not surprised to learn that the ambrosia of Mount Olympus was composed largely of honey, according to Roscher being indeed nothing more nor less than honey itself, — a glorified form of that delicacy, one takes for granted ; while nectar, that delectable drink of the gods, Roscher says was mead ! — also no doubt tintured by heavenly contact.

One gets, from reading Athenæus, a vivid idea of the luxurious living indulged in by some among the ancients.

He quotes Antiphanes as saying, —

" Four female flute-players do have their wages,
Twelve cooks, and just as many sweet-meat makers,
Asking for plates of honey."

Thus too we form an idea of the scale upon which feasting was carried on and also of the amount of honey consumed at feasts.

Here may be introduced another quotation from Anti-

¹ See page 222.

phanes, who gives the following interesting catalogue of the ingredients used to prepare a certain dish : —

“Dried grapes, and salt, and eke new wine
Newly boiled down, and asafœtida,
And cheese, and thyme, and sesame,
And nitre too, and cummin seed,
And sumach, honey, and marjoram,
And herbs and vinegar and oil
And sauce of onions, mustard and capers mixed,
And parsley, capers too, and eggs.
And lime, and cardamums, and th' acid juice
Which comes from the green fig-tree, besides laurel
And eggs and honey and flour wrapped in fig-leaves,
And all compounded in one savory forcemeat.”

The onion as served by these epicurean cooks was a patrician and costly vegetable, vying with the sumptuous forcemeat ball just described ; and Athenæus, quoting Philemon, assures us, —

“Now, if you want an onion just consider
What great expense it takes to make it good :
You must have cheese, and honey, and sesame,
Oil, leeks, and vinegar, and asafœtida,
To dress it up with ; for by itself the onion
Is bitter and unpleasant to the taste.”

Lettuce was treated to a yet more remarkable and extravagant dressing by a certain epicure, —

“But Aristoxenus, the philosopher of Cyrene, a real devotee of the philosophy of his country (from whom hams cured in a particular way are called Aristoxeni), out of his prodigious luxury used to syringe the lettuces which grew in his garden with mead in the evening, and then, when he picked them in the morning, he would say that he was eating green cheesecakes which were sent up to him by the earth.”

A certain very luxurious dish of the Lydians our author

tells us is mentioned by Alexis in his book "The Spinners." It is a cook who speaks, lauding his own skill :

"'T is a most grand invention, and 't is mine ;
And if I put a dish of it before you,
Such will be your delight that you 'll devour
Your very fingers ere you lose a bit of it.

You will serve up an egg well shred, and twice
Boil'd till it's hard ; a sausage, too, of honey ;
Some pickle from the frying-pan, some slices
Of new-made Cynthian cheese ; and then
A bunch of grapes, steep'd in a cup of wine :
But this part of the dish is always laughed at,
And yet it is the mainstay of the meal."

Cheesecakes made with honey or served with it were very great favorites ; without them no banquet seems to have been complete, and they are referred to by many of the ancient writers.

There were many kinds of cheesecakes, some of which were made without cheese at all ; but the true cheesecakes were made from cheese, usually mixed with some grain and often with honey as well.

Athenæus, desiring to enlighten posterity on the subject of cheesecakes, has given us a few recipes which are interesting if not attractive. Chrysippus, "that clever writer on confectionery," he informs us, makes a cheesecake called *phthosis* thus : —

"Take some cheese and pound it, then put it into a brazen sieve and strain it ; then put in honey and a hemina¹ of flour made from spring wheat, and beat the whole together into one mass."

Chrysippus does not leave us forlornly contemplating one cheesecake, however ; he presents us with knowledge to make also the *tyrocoscinum*, which is done thus : —

¹ About half a pint.

"Pound some cheese carefully, and put it into a vessel; then place above it a brazen sieve and strain the cheese through it. And when you are going to serve it up, then put in above it a sufficient quantity of honey."

Yet other cheesecakes, he tells us, are made thus: —

"Put some honey into some milk, pound them, and put them into a vessel, and let them coagulate; then, if you have some little sieves at hand, put what is in the vessel into them, and let the whey run off; and when it appears to you to have coagulated thoroughly, then take up the vessel in which it is, and transfer it to a silver dish, and the coat, or crust, will be uppermost."

"And also," says he, "in Crete they make a kind of cheesecake which they call gastris. And it is made thus: Take some Thasian and Pontic nuts and some almonds, and also a poppy. Roast this last with great care, and then take the seed and pound it in a clean mortar; then, adding the fruits which I have mentioned above, beat them up with boiled honey, putting in plenty of pepper, and make the whole into a soft mass (but it will be a black color because of the poppy); flatten it and make it into a square shape; then, having pounded some white sesame, soften that too with boiled honey, and draw it out into two cakes, placing one beneath and the other above, so as to have the black surface in the middle, and make it into a neat shape."

One cannot help wondering whether this medicated honey-cake was not the same given to departing spirits to quiet Cerberus, and whether, when partaken of by living epicures it was most potent in producing nightmare or the gorgeous dreams of the opium-eater. Whatever its effect, it certainly must have been extraordinary.

The following is the opinion upon cheesecakes and upon honey held by Archestratus, the inventor of made dishes, as he called himself.

"But praise the cheesecakes which from Athens come;
And if there are none, still of any country
Cheesecakes are to be eaten; also ask
For Attic Honey, the feasts' crowning dish —
For that it is which makes a banquet noble."

Antiphanes, in his "Lemnian Women," thus feelingly does justice to the subject: —

"A three-legg'd table now is laid, and on it
A luscious cheesecake, O ye honored gods,
And this year's honey in a silver dish."

Cheesecakes steeped in honey or covered with honey were regarded with great favor for dessert, and we are informed of the manner in which a guest should express appreciation at a well-ordered table: "One of the guests would say of the dessert (which was the second course) as Euripides says in his 'Cretan Women,' —

"Certainly, second thoughts are much the best;
For what now can the table want? or what
Is there with which it is not amply loaded?
'Tis full of fish fresh from the sea, besides
Here's tender veal, and dainty dishes of goose,
Tartlets, and cheesecakes steeped most thoroughly
In the rich honey of the golden bee."

Right here let us turn for a moment from the feast of Athenæus to enjoy one of Martial's witty epigrams, written to Charinus: —

"Thirty times in this one year, Charinus, while you have been arranging to make your will, have I sent you cheesecakes dripping with Hyblæan thyme. I am ruined: have pity on me at length, Charinus. Make your will less often, or do that once for all for which your cough is ever falsely leading us to hope. I have emptied my coffers and my purse. Had I been richer than Croesus, Charinus, I

should become poorer than Irus, if you so frequently devoured my poor repast."

The dessert, or second course, was a lighter but very important part of the meal, at which was often served the more delicate meats, game, birds, fish, beans, and other delicacies.

"Eggs, too, often formed a part of the second course, as did hares and thrushes, which were served up with honey-cakes."

Thrushes and other small birds were frequently covered with honey, and Plato in his "Phaon" — so Athenæus tells us — speaks of

"A vigorous cheesecake, and a pregnant mealcake,
And sixteen thrushes whole, well smear'd with honey."

The delectable nature of thrushes served with honey is thus graphically set forth by Telechides, —

"But roasted thrushes with sweet cheese-cakes served
Flew of their own accord down the guests' throats."

From Athenæus we learn that Ehippus in his "Cydon" gives the following details of a very substantial dessert :

"And after supper they served up some kernels,
Vetches, and beans, and groats, and cheese, and honey,
Sweetmeats of various kinds, and cakes of sesame,
And pyramidical rolls of wheat, and apples,
Nuts, milk, hempseed too, and shell-fish,
Syrup, the brains of Jove."

Nichochares in his "Handicraftsmen" boasts, —

"I've loaves, and barley-cakes, and bran, and flour,
And rolls, oblias, and honey'd cheese-cakes,
Epichyti, ptisan, and common cheese-cakes,
Dendalides, and fried bread ;"

giving one a desire to step in and buy, out of curiosity if for no other reason, at least a few of those strange-sounding edibles.

At Argos, we are told, was a kind of cheesecake brought to the bridegroom from the bride, —

“It is roasted on the coals, and the friends of the bridegroom are invited to eat it; it is served up with honey, as Philetas tells us in his ‘Miscellanies.’”

Magnes in his “Bacchus” inquires, with what unction one can imagine, —

“Have you ne’er seen the fresh cheese-cakes hissing
When you pour honey over them?”

In the “Leptiniscus” of Antiphanes, Athenæus tells us, occurs the following pleasant dialogue: —

- “A. Then what think you of almonds?
B. I feel very friendly to them,
They mingle well with honey.
A. If a man should bring you honied cheese-cakes?
B. I should eat them,
And swallow down an egg or two besides.”

In Antiphanes are found also these lines, —

“To eat ducks, and honey-combs of wild bees, and eggs,
And cheese-cakes, and unwash’d radishes,
And rape, and oat-meal groats, and honey.”

Honeyed cheesecakes were considered a worthy offering to the gods, as says Semus in the second book of the “Deliad,” —

“In the island of Hecate the Delians sacrifice to Iris, offering her the cheesecakes called basyniæ; and this is a cake of wheat-flour, and suet, and honey, boiled up together.”

Honeycakes that were not cheesecakes were also held

in high esteem, as we learn from Archippus in "Heracles Marrying," —

"The board was loaded with rich honey-cakes."

Honeycakes were made of cereals of various sorts mixed with honey, and sometimes they were made of oil and honey.

The food Chrysocola, made of honey and flax, most of us would be content to leave to the ancients, as also the gifts designed for the maiden whom Ibycus thus sings :

"Bring gifts unto the maiden, cakes of sesame,
And groats, and cakes of oil and honey mixed,
And other kinds of pastry, and fresh honey."

We must not overlook a certain thin cake made of sesame and honey which has had the honor of being mentioned by Anacreon, Aristophanes, and Sophocles.

Philetas in his "Miscellanies" speaks of cakes of honey, made and sold by a regular baker.

At the Copis, a Spartan feast, every one receives "a portion of goat's flesh, and to each a little loaf made of oil and honey, a newly made cheese, a slice of paunch, and black pudding, and sweetmeats and dried figs, and beans and green kidney beans."

Ephippus makes the following confession : —

"Cakes made of sesame and honey, sweetmeats,
Cheese-cakes, and cream-cakes, and a hecatomb
Of new-laid eggs, were all devour'd by us."

There must be mentioned sesamides, cakes made of honey and roasted sesame and oil, of a round shape, not unlike the sugar cookies of our childhood probably ; and there are the encrides, which are frequently alluded to. These are cakes boiled in oil, and after that "seasoned with honey." These certainly are the classical progenitors

of our New England "doughnuts," our oil for boiling being from another source than the "fat olive," and our external "seasoning" being of powdered sugar instead of honey.

"Groats and encrides,
And other cakes, and fresh sweet honey."

And Aristophanes speaks of encrides thus : —

"And not be a seller of encrides."

Honey was used, as we know, in the making of honeyed wine, and upon this point Athenæus presents Theophrastus, who says that "the wine at Thasos which is given in the prytaneum, is wonderfully delicious ; for it is well seasoned ; for they knead up dough with honey, and put that into the earthen jars : so that the wine receives fragrance from itself, and sweetness from the honey."

Martial in one of his epigrams speaks thus enthusiastically of honeyed Falernian wine : —

"Attic honey thickens the nectar-like Falernian. Such drink deserves to be mixed by Ganymede."

But honey itself was used as an antidote to the effects of wine, and we find it referred to in this capacity.

In a poetical fragment of Sopater, the parodist of Alexandria, quoted by Athenæus, we read the following : —

" 'Tis sweet in early morn to cool the lips
With pure fresh water from the gushing fount,
Mingled with honey in the Baucalis,
When one o'er night has made too free with wine,
And feels sharp thirst."

Nicander the Colophonian, in his "Dialects," says that celebe is a vessel used by the shepherds in which they preserve honey. For Antimachus the Colophonian, in the fifth book of his "Thebais," says, —

"He bade the heralds bear to them a bladder
Fill'd with dark wine, and the most choice of all,

The celebea in his house which lay,
Fill'd with pure honey."

And in a subsequent passage he says : —

" But taking up a mighty celebeum
In both his hands, well fill'd with richest honey,
Which in great store he had most excellent."

And again he says : —

And golden cups of wine, and then besides,
A celebeum yet untouch'd by man,
Full of pure honey, his most choice of treasures."

Eubulus, in his " Rich Woman," humorously describes the market at Athens : —

" And in the same way everything is sold
Together at Athens ; figs and constables,
Grapes, turnips, pears and apples, witnesses,
Roses and medlars, cheese cakes, honeycombs,
Vetches and law-suits ; bee-strings of all kinds,
And myrtle-berries, and lots for offices,
Hyacinths, and lambs, and hour-glasses too,
And laws and prosecutions."

The most startling dish of all those in which the bee figures is mentioned by Pherecrates, " the strictest Atticist of all." He tells us : —

— " There were rivers
With tender pulse and blackest soup o'er flowing,
There too were cakes of groats well steep'd in milk,
In large flat dishes, and rich plates of — beestings ! "

We are enabled to recover our serenity, however, through Martial, who in one of his epigrams elucidates the mystery. The name of the epigram in the English translation is Beestings, and it reads thus : —

" We give you, from the first milk of the mothers, sucklings of which the shepherd has deprived the dams while yet unable to stand."

From this it would appear that the dish of the terrifying name is in reality composed of perfectly innocent and extremely young lambs or kids. In short, the whole misapprehension arises from a somewhat unfortunate word used in the English translation. For beestings or biestings, as it is more properly written, in English means the first milk from a fresh milch cow or other milk-giving domestic animal, and is derived from the Anglo-Saxon. Evidently it has at times been used of the new-born animals themselves, and is so used in the present case.

Besides its very agreeable use at the table, honey, as in all other parts of the world, was valued as a medicine by the Greeks and Latins, and also as a medium for administering medicine, particularly to children, for it would seem that the infants of antiquity, although they doubtless acquired the Latin tongue with ease at an early age, did not differ in other respects from modern children.

One can but hope in mercy to them that the honey in their wormwood was sweeter to their palates than the learning their wise ones prepared for them is to the modern mind. Quintilian thus enlightens us upon both subjects in his "Institutes of the Orator," a work which treats of the education of children in a manner that justifies the fear he expresses in the last paragraph:—

"Hitherto we have endeavored to embellish our work with something agreeable, not for making an ostentatious show of wit, as for that purpose we could have chosen a more copious matter; but in order that young persons, induced by some pleasure in reading, might the easier receive the instruction we judged necessary for helping their studies; which, if it had been conceived in a dry, hungry manner, there was reason to fear it would beget loathing in their minds, and grate with harshness on their delicate ears. In a finer view, Lucretius says, he delivered

the precepts of philosophy in verse, and therefore uses this familiar comparison: —

‘Physician-like, who when a bitter draught
Of wormwood is disgusted by a child,
To cheat his taste, he brims the nauseous cup
With the sweet lure of honey.’

And, indeed, I am apprehensive that this Book may seem to have little honey in it, and a great deal of wormwood, that is, may be more salubrious than sweet to studies.”

That bees were extensively cultivated in Greece before 600 B. C. we know from the fact that one of Solon’s laws related to them, for Plutarch tells us, in his “Life of Solon”: “If any one would raise stocks of bees, he was to place them three hundred feet from those already raised by another.”

The bees receive their chief attention in Greek and Latin literature, however, from the writers upon practical agriculture or natural history. Aristotle has devoted more space to the bees in his “History of Animals,” than to any other insect, and he has gathered together what was known of bees and bee-keeping in his time, and has so well done his work that succeeding writers almost to the present day have copied him.

Bee-keeping in the time of Aristotle did not differ essentially from bee-keeping fifty years ago, in some respects being superior, as evidently it was the habit of the Greeks to remove the combs from the hives without killing the bees, — a cruel and wasteful practice followed by succeeding generations even to the present time.

The Greeks generally used smoke to *quiet* the bees, as is done by the more advanced bee-keepers to-day, and the industrious insects were not as a rule smoked to death with fumes of sulphur, though it is not improbable this was some-

times done, as Aristotle says that many bees perish by the fumes of sulphur, though he also incidentally informs us upon the other side of this interesting subject, where he says, —

“The bees do not hunt for prey, but they both produce and lay up stores. This is plainly shown when the honey-dealers attempt to take the combs. When they are fumigated and suffering from the effects of the smoke, they devour the honey greedily, which they are not observed to do at other times ; but they spare it and store it up for food.”

Smoking wild bees to get their honey was practised, as Apollonius Rhodius, who lived a little later than Aristotle, tells us in his “Argonauts,” where the Greek heroes affrighted the overweening Bebryces who attacked them, —

“As shepherds or bee-keepers smoke a mighty swarm of bees in a rock ; and these the while, all huddled in their hive, buzz round confusedly ; and far from the rock they dart, smoked right through by the sooty fumes ; so these men no longer abode steadfastly, but fled routed within Bebrycia, carrying the news of the death of Amycus.”

Virgil also compares the disorder among the Latins at the onset of Æneas to a swarm of bees driven forth by smoke : —

“Among the trembling citizens dissension arises ; some press to dismantle the town, and open the gates to the Trojans, and drag the king himself to the ramparts. Others take up arms, and march on to defend the walls.

“As when a shepherd hath traced out a swarm of bees enclosed in some harboring cleft, and filled their cells with bitter smoke ; they within, alarmed for their affairs, in trepidation run hither and thither through the waxen camp, and with loud buzzing whet their rage : through their cells the black stench is rolled ; then with faint murmur the

caverns within resound ; to the empty regions of air the smoke ascends."

We recall also the simile of the bees killed by smoke in Lycophron's "Cassandra."¹

The ancient Greeks knew all that could be known concerning the management of bees so far as this can be carried on without the revelations of modern science. They observed carefully and carefully recorded the results of their observations, and the amount of information they acquired is remarkable considering the crude methods of scientific study then followed.

Many mistakes of course crept into these observations, and many absurdities were gravely recorded and handed on by Aristotle, who wrote, however, with a sincerity and straightforwardness as well as with a guarded manner of expression that resembles the style of modern scientists. His followers were often prone to embellish the facts, but this Aristotle never does.

The Roman Pliny, some four hundred years later than Aristotle, wrote an elaborate treatise on bees as a part of his "Natural History." His work has survived, and to-day is the best known of the ancient works on nature, including bees, though there were many other books written before his time in which bees were considered. He himself tells us : —

"It is not surprising that there have been persons who have made bees their exclusive study ; Aristomachus of Soli, for instance, who for a period of fifty-eight years did nothing else ; Philiscus of Thasos, also, surnamed Agrius (or the 'wild man'), who passed his life in desert spots, tending swarms of bees. Both of these have written works on this subject."

The Romans attained the greater part of their practical

¹ Page 285.

knowledge of bee-keeping from the Greeks, who, wandering in colonies to Italy and Sicily, pursued bee-culture as a part of their agricultural life.

The Roman Varro wrote upon bees just before Virgil; and Columella, who a little later than Virgil also wrote upon agriculture and bee-keeping, tells us that his tutor Hyginus, the bee-master, was the most learned of bee-men in his time, that he had gathered together the works of his contemporaries and predecessors, and had added valuable information that came as a result of his own observations. Hyginus's works are unfortunately lost, but there remains to us the poet Virgil, who devoted his fourth "Georgic" to bees, and there tells us what was known concerning the management of bees as well as many of the curious superstitions about them.

There is a long line of lesser lights, of which there are not less than seventy names of Greek agriculturists known, whose writings, unfortunately lost, contained treatises on bee-keeping.

According to some writers, no less than six hundred philosophers gave themselves to the study of these interesting insects. But in spite of this, little was gained beyond what Aristotle had already recorded, even Pliny's somewhat voluminous work upon bees being little more than an ornate version of Aristotle. About the time that Pliny was writing his elaborate "Natural History" Columella was engaged upon his agricultural work in which he describes a smoker designed and used for quieting bees, showing to what an extent the industry of bee-keeping was followed in his time.

The ideas, right and wrong, of the ancients have already been considered in connection with the life history of the bees.

Bee-keeping in ancient Greece and Italy was of great

importance to the farmer, the proceeds in wax and honey forming a valuable part of his revenue. Even the poorest peasants kept their bees, placing the hives in the open air of field or forest.

It was not only among the agriculturists, however, that bees were valued. At the time of the Roman Empire the love of bee-keeping accompanied the wide-spread love for villas, and bee-culture became a matter of fashion among the wealthy Romans. Bees were hived in the walls of villas, under the covered piazzas of pleasure grounds and in fruit gardens and parks, and especially in bee-houses near the villas.

Columella gives a reason for having the hives close to the house which is not to the credit of the peasants. He advises that they be placed near the house so that the owner can frequently come upon them unawares; adding that success in bee-culture demands the greatest honesty and fidelity, and that the bees themselves hate and abhor a fraudulent overseer.

Cicero, in his "Essay on Old Age," considers the successful production of honey an essential to good farming.

It was the proper thing to give to the valued guest fresh honey taken from the hives of the host.

Wax as well as honey had its value, as it was used for medicines and as a foundation for plasters and salves.

Wax was sometimes used to fashion the little figures of ancestors which were kept in the houses and produced upon certain ceremonial occasions. It was also used to form miniature images of animals which were bought by those too poor to buy living animals for the sacrifices.

The making of wax flowers and wax fruits, trivial as the occupation is now deemed, where it is done merely for amusement, has a very respectable origin, for the making of fruits and flowers in wax was carried to great perfection

in Rome and also in Alexandria. We are told that wax fruits were so remarkably made that once the stoical court philosopher of King Ptolemæus saw upon the table a dish of pomegranates looking so natural that he bit one !

Varro praises the artfulness of the Roman wax-worker Posis, who made apples and bunches of grapes so like nature that the connoisseur could not distinguish them.

Masks taken after death, which were used in funeral processions, were ultimately cast in wax.

Pliny tells us that —

“The first man who expressed the human features by fitting a mould of plaster upon the face, and then improving it by pouring melted wax into the cast, was Lysistratus of Sicyon.” He was the first to make faithful likenesses, his predecessors, like certain modern photographers, having striven only to produce a handsome image.

When a man became celebrated his figure in wax appeared in the atrium of the private house as well as in public buildings.

Doubtless referring to this, Tacitus, in a dialogue concerning “Oratory,” says : —

“The homage of visitors, the train of attendants, and the multitude of clients, which Aper has represented in such pompous colors, have no charms for me ; no more have those sculptured honors which he mentioned ; though they too have made their way into my house, notwithstanding my inclinations to the contrary.”

And Juvenal in his satires says : —

“Though your long line of ancient statues adorn your ample halls on every side, the sole and only real nobility is virtue.”

At the principal festivals of Saturn, Bacchus, and Ceres, wax candles and wax wreaths were much used.

Wax images and wax fruits were also extensively used

in the celebrations of the festival of the resurrection of Adonis, though this festival was observed with the greatest splendor at Alexandria in Egypt during the time of Greek pre-eminence there, Queen Arsinoe herself giving it in magnificent style.

The lovely Adonis, dear to Aphrodite, represented the living procreative form of nature, which dying in winter has a glorious resurrection in spring.

The death of Adonis was first celebrated, and lamentations continued for seven days. Upon the eighth he arose from the dead and the people broke forth in jubilee. The week of lamentation, as Brugsch points out, recalls the holy week, the time of mourning for the dead Lord, which is still observed in the Roman Catholic church and other communions.

At the Adonis festival the women placed about the catafalque — upon which was an image of the god — waxen figures of fruit and animals, and there were also little figures of the god brought out to public view.

A most delightful account of an Adonis festival in Alexandria is given by Theocritus in the fifteenth "Idyl."

Two women of Syracuse go together to the festival, and as the translator, Andrew Lang, in the introduction truly says, "Nothing can be more gay and natural than the chatter of the women, which has changed no more in two thousand years than the song of birds."

Not wax images alone were used at the festival of Adonis, which at its termination was a veritable outburst of gladness and good cheer, but natural fruits and other objects were used, some of which are enumerated in the beautiful Psalm of Adonis, occurring in the "Idyl" already referred to :

"Before him lie all ripe fruits that the tall trees' branches bear, and the delicate gardens, arrayed in baskets of silver, and the golden vessels are full of incense of Syria. And

all the dainty cakes that women fashion in the kneading tray, mingling blossoms manifold with the white wheaten flour, all that is wrought of honey sweet, and in soft olive oil, all cakes fashioned in the semblance of things that fly, and of things that creep, lo, here they are set before him."

Less innocent were some of the uses to which wax was put, and we learn that wax images among the ancients were used by sorcerers with the expectation of working harm to their fellow-men. In his "Laws," in the chapter relating to poisoning and sorcery, Plato has the following advice to offer, for although he evidently does not himself heartily believe in the efficacy of these waxen images he recognizes the power they exert over the minds of the people : —

"And when men are disturbed in their minds at the sight of waxen images fixed either at their doors, or in a place where three ways meet, or on the sepulchres of parents, there is no use in trying to persuade them that they should despise all such things because they have no certain knowledge about them.

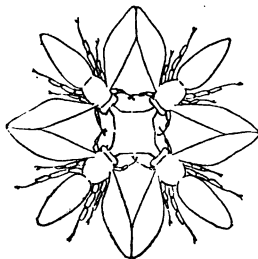
"But we must have a law in two parts, concerning poisoning, in whichever of the two ways the attempt is made, and we must entreat, and exhort, and advise men not to have recourse to such practices, by which they scare the multitude out of their wits, as if they were children, compelling the legislator and the judge to heal the fears which the sorcerer arouses, and to tell them in the first place, that he who attempts to poison or enchant others knows not what he is doing, either as regards the body (unless he has a knowledge of medicine), or as regards his enchantments (unless he happens to be a prophet or diviner). Let the law, then, run as follows about poisoning or witchcraft : He who employs poison to do any injury, not fatal, to a man himself, or to his servants, or any injury, whether fatal

or not, to his cattle or *his bees*, if he be a physician, and be convicted of poisoning, shall be punished with death ; or if he be a private person, the court shall determine what he is to pay or suffer. But he who seems to be the sort of man who injures others by magic knots, or enchantments, or incantations, or any of the like practices, if he be a prophet or diviner, let him die ; and if, not being a prophet, he be convicted of witchcraft, as in the previous case, let the court fix what he ought to pay or suffer."

We also incidentally are informed in the last paragraph of the estimation in which bees were held.

Wax was used, too, to cover the surface of writing tablets, as upon its yielding substance lines could be traced with the stylus. It was also used to wax the pipes of shepherds, and was put to innumerable other uses.

Pliny tells us that Punic wax was considered best for medical preparations, also, "Wax is made black by addition of ashes of papyrus, and a red color is given to it by admixture of alkanet ; indeed, by the employment of various pigments, it is made to assume various tints, in which state it is used for making likenesses, and for other purposes without number, among which we may mention varnishing walls and armor to protect them from the air."



XVIII

IN CHRISTIAN AND MEDIÆVAL TIMES

THE bee of the Middle Ages is a sombre bee. It does not fly joyously through light-hearted love-songs, but rather lends itself to purposes of moralizing, enters into magic and symbolism, and becomes a part of all kinds of superstition.

The myths of the pagan times have given place to the legends of the new religion. In these Christian times it is the wax which has become important, as in Greek and Latin classical ages it was the honey, and in India it was the bee itself; for the wax is necessary to supply the tapers burned in the churches.

The Fathers of the Church, Saint Jerome, Saint Basil, Tertullian, and others got from the bee many and varied allegorical references to the life of the Christian, which were copied by their successors.

The Romans are said to have established the first extensive bee-industry on the Rhine, but the Germans were not slow to follow the lead thus given them. The outposts of colonization in Germany being the monasteries whose monks pursued agriculture and bee-keeping, it is not surprising that, living as they did with the bees, and closely observing their orderly and remarkable habits, they too drew many lessons from them, in addition to those they received from the Latin Fathers.

Honey, which in the pagan world everywhere symbolized the pleasures of the senses, in the Christian world became

symbolical of the temptations of the flesh on the one hand, and of purity on the other.

The bee, in so far as it lived pure and unspotted with clean wings in the midst of honey, was a symbol of the soul which kept itself pure and unspotted from the temptations of the senses.

Honey, as symbolical of purity, was used the day on which Christ rose from the dead, when it was mingled with milk in the communion cup.

A drop of honey was also put into the mouth of the child at baptism, the gift of pure bees, symbolizing spiritual purity.

Honey was also eaten on Maundy Thursday, and in some places is still, probably with its old significance of purification, and as a preparation for Easter.

Upon the Jewish New Year Day a piece of apple dipped in honey is eaten previous to the elaborate evening meal, a prayer being offered to the "Creator of the fruit of the earth," the fruit and the honey symbolizing prosperity or "sweet peace."

Bees were to the early Christians, as to the pagans of Greece and Italy, an emblem of eloquence and wisdom, and are fabled to have placed themselves upon the lips of many of the Fathers of the Church when they were in their infancy, so that Saint Ambrose, Saint Isidor, Saint Dominicus, and others were treated by them as of old Plato, Pindar, and other pagan writers were treated.

Because of their eloquence, which was said to be as sweet as honey, a bee-hive was the emblem of Chrysostom, of Ambrose, and of the so-called Doctor Mellifluus, Bernard of Clairvaux.

The Nestorian bishop Shēlēmōn, about 1222 A. D., wrote in Syriac the "Book of the Bee," the object and method of which he explains in an address to a brother bishop, —

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“We have called this book the ‘Book of the Bee,’ because we have gathered of the blossoms of the two testaments and of the flowers of the holy Books, and have placed them therein for thy benefit. As the common bee with gauzy wings flies about, and flutters over and lights upon flowers of various colors, and upon blossoms of divers odors, selecting and gathering from all of them the materials which are useful for the construction of her handiwork ; and having first of all collected the materials from the flowers, carries them upon her thighs, and bringing them to her dwelling, lays a foundation for her building with a base of wax ; then, gathering in her mouth some of the heavenly dew which is upon the blossoms of spring, brings it and blows it into these cells, and weaves the comb and honey for the use of men and her own nourishment, in like manner have we, etc.,” — that which follows being an explanation of the Scriptures and the spiritual life, rendered in a manner not infrequently used by the early writers.

Bees sometimes appear in the legends as companions of the saints. When Saint Modomoc left Ireland they followed him over the sea, as they also did Saint David ; and about the head of another saint, who became a monk, they placed themselves in the form of a tonsure.

By her prayers Saint Gabinate was able to transform a hive of bees into armed warriors, who were very efficient in repulsing the enemy, and they are said to have driven away the foe from the monastery of Saint Serenicus.

In few instances have the bees been accused of disloyalty to the Church and her saints, but this sometimes occurred, as when Saint Albericus was placed naked among them. Probably they did not recognize him in that unaccustomed state, and so fell upon and stung him.

A far more pious use was made of their stings in the case of Saint Medard : —

“ When a thief by night had stolen Saint Medard’s bees, the bees in their master’s quarrel, leaving their hive, set upon the malefactor ; and eagerly pursuing him which way soever he ran, would not cease stinging of him, until they had made him (whether he would or not) to go back again to their master’s house ; and there falling prostrate at his feet, submissively to cry him mercy for the crime committed. Which being done, so soon as the saint extended unto him the hand of benediction, the bees, like obedient servants, did forthwith stay from persecuting him, and yielded themselves to the ancient possession and custody of their master.”

In a book of songs used by the Moravians the wound in the side of the Saviour is compared to a rose ; and he who derives love and devotion from contemplating the wounds of the self-sacrificing Christ is compared to the bee which sucks the honey from the rose.

“ Ye green branch, ye noble scion,
Ye honey rich flower,
Ye open paradise,
Grant my prayer.
Let my soul be a little bee
Upon the rose of thy wound !
Ah, ah, how sweet is this dew,
How lovely to my soul !
How good to be upon such a meadow,
In such a flower cup !
Let me ever be a little bee
Upon the rose of thy wound.”

And again, —

“ O Lord Jesus, give to me gifts
Such as the wise bees have,
Since I have reconciled myself to thee

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Upon the roses of thy wounds,
May I bear home in my mouth and in my heart
The virgin honey of thy blood."

In the church hymns of a later day we find a similar idea, as in a long hymn by Ernest Gottlieb Waltersdorf, composed in the middle of the eighteenth century, which takes the bee for its symbolical subject and from which the following lines are given in a somewhat free translation, —

"The bees creep into the deep flower-cup, and what can better be for me and all poor souls than to hide in the wounds of Jesus, which at all hours stand open.

"The bee builds its little cell from flower sap. My Jesus, the power of thy spirit serves me upon all occasions. I build for myself a strong dwelling from thy grace.

"The bees never suffer but one king among them. Ah, Jesus, help us all to shun idols, that our hearts may be surrendered in love and truth to thee alone."

Sometimes, however, the bee was turned as a weapon against the Church, as where Marnix in the sixteenth century wrote a "A Roman Beehive" as a satire upon the Romish church.

And every one knows of Mandeville's "Fable of the Bees," written in 1729. This unfortunate book was considered so anti-Christian that it was burned in London by the hangman, though one reading it to-day would probably cast it aside as being more stupid than dangerous.

Bees appear upon the coat-of-arms of the house of Barberini, to which family Pope Urban VIII. belonged, and when he built the church Della Sapienza in Rome, he is said to have taken the form of the bee for the ground-plan.

It was believed that at the death of their owner the bees left their hives in search of him, unless his demise was promptly and formally announced to them, and this belief still prevails in the western and northern countries. More-

over, it is in some places believed that the souls of people leave the world and return to it in the form of bees,—a myth with which we are already familiar in the more eastern lands.

With its heavenward-striving flight in the realms of light, the bee is a symbol of resurrection. It does not here, as in Greece and Italy, come forth from a dead body, though we are told that Christ has been compared to the sacrificial bull, and the Christians to the bees that came forth from it,—a figure evidently borrowed from classical literature.

Peter of Capua called Christ "*Apis ætheria*," and he is elsewhere denominated, "*Our honey*."

Because of their faith and their good works prominent virgins were credited with the attributes of bees, and Saint Ambrose calls Saint Agnes "*Apis argumentosa*." This recalls the name of "*Melissa*" given to the priestesses of the pagan deities.

In a painting by Titian of the Virgin Mary the Christ Child is holding a bee in his hand, and the Virgin Mary has been denominated "*the honey of the world*."

Thomas of Cantimpré wrote a religious work in which all the Christian virtues are shown to reside in bees.

But Pater Abraham a Santa Clara in his book compares only the monastic life to the bee-hive, because the bees live as virgins; and this idea was the fundamental one in the illustrations drawn from bees by many others of the churchly fathers. The bee was very generally a symbol of the greatest purity, and the Immaculate Conception has been compared to the flower from which the bee extracted honey without violating it.

Herbert said, —

"Bees work for men, and yet they never bruise
Their Master's flower, but leave it, having done,
As fair as ever and as fit to use;
So both the flower doth stay and honey run."

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This reminds us of lines from the Buddhist "Dhammapada": —

"As the bee collects nectar and departs without injuring the flower or its color or scent, so let a sage dwell in his village."

It was because of the supposed purity of the bee that honey and wax had their significance in religious ceremonies. Church candles must needs be made of pure, unadulterated beeswax.

There is a legend that the monastery of Altenberg was founded by bees.

The pious priest Gottfried once saw bees under a bramble-bush busily forming a beautiful altar of wax to which came the beasts of the fields and bowed themselves down, and upon the spot he built a chapel, still called the bee chapel. Having done this, in a dream he saw approach a long procession of white-clad, flower-bedecked maidens. The dream was soon verified, for the bones of some of the unfortunate virgins of Saint Ursula's train were brought there, and from the little chapel grew the great and celebrated monastery of Altenberg.

To the confusion of certain unbelievers who impiously threw away the consecrated wafer, the devout bees upon several occasions are said to have cared for the holy relic.

In his "Feminin Monarchi" Charles Butler gives us a very interesting account of some of these legends. He tells us: —

"There were bees so wise and skilful as not only to descry a certain little God-a-mighty, though he came among them in likeness of a Wafercake; but also to build him an artificial chapel. If I should relate the story, all men, I know, would not believe it: notwithstanding, because every man may make some use of it, you shall have it.

"A certain simple woman, having some stalls of bees,

which yielded not unto her her desired profit, but did consume and die of the Murrain, made her moan to another woman more simple than herself ; who gave her counsel to get a consecrated Host, and put it among them.

“According to whose advice she went to the priest to receive the Host ; which, when she had done, she kept it in her mouth, and being come home again, she took it out, and put it into one of her hives. Whereupon the murrain ceased, and the honey abounded. The woman, therefore, lifting up the hive at the due time to take out the honey, saw there (most strange to be seen) a chapel built by the bees, with an altar in it, the walls adorned by marvellous skill of architecture, with windows conveniently set in their places ; also a door and a steeple with bells. And the Host being laid upon the altar, the bees, making a sweet noise, flew round about it.

“Unto this story my author immediately addeth another, like unto it, and as likely : How certain thieves, having stolen the silver box wherein the Wafer-Gods used to lie, and finding one of them there, being loth, belike, that he should lie abroad all night, did not cast him away, but laid him under a hive ; whom, the bees acknowledging, advanced to a high room in the hive ; and there, instead of his silver box, made him another of the whitest wax ; and when they had so done, in worship of him, at set hours, they sung most sweetly beyond all measure about it ; yea, the owner took them at it at midnìght, with a light and all. Where-with the Bishop, being made acquainted, came thither with many others ; and lifting up the hive, he saw there, near the top, a most fine box, wherein the host was laid, and the choirs of bees singing about it. The Bishop, therefore, taking the host, carried it with the greatest honor into the church ; whither many resorting were cured of innumerable diseases.”

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These stories Butler gets from a Latin writer, and in different parts of Germany and in neighboring countries are many similar legends of bees building a waxen chapel or a monstrance over a lost or desecrated host.

When Saint Bonizella died alone, the bees came and formed in the hand of the dead virgin a beautiful waxen communion cup. It is also reported that bees entered the grave and built their combs in the bodies of two holy virgins of Verona.

The bee was considered a servant of God and of the Church because of its power to produce pure wax, and the loss of a swarm of bees was a grave misfortune, portending ill to the house which it deserted.

There is a Latin adjuration to the bee which may thus be translated : —

“Ye are the handmaidens of the Lord ; I implore you in the name of the Lord not to flee from the sons of men.”

There was also a remarkable blessing to be pronounced over bees, found upon the cover of a book dated 1570, in a certain library in Germany. Being translated, it reads thus : —

“Maria stood upon a very high mountain. She beheld a swarm of bees flying towards her. She raised her beneficent hand. She forbade it to depart and made to it promises of happiness. She placed for it a hive that Saint Joseph had made. Into that she bade it enter and there enjoy life, in the name of the Father, the Son, and the Holy Ghost. Amen.”

An exorcism to the queen of the hive is also found in a Latin ecclesiastical work : —

“I implore thee, mother of the bees, through God the King of Heaven and through the Redeemer the Son of the Lord, that thou fliest not high, nor far, but that rather thou

comest at once to a tree ; there gather with all thy kind, or with thy companions.

“There have I prepared for thee a good hive, that there thou mayst labor in the name of the Father, the Son, and the Holy Ghost. Amen.”

These bee-myths of the Middle Ages had a symbolical meaning that at the present time they have lost, though a certain superstitious feeling still lingers in the rural portions of several countries ; and in Germany one can hear the song, —

“ Bienlein, Bienlein,
Bleib bei mir im grünen Gras,
Wo einst Jesus, Maria, and Joseph satz.”

Little bee, little bee,
Stay by me on the green grass,
Where once Jesus, Mary, and Joseph sat.

Menzel tells of an old Catholic hymn which calls the passage of the holy ones who ascend to heaven from earth a swarm of bees in safe flight, sweetly laden with their virtues.

This recalls a similar figure used by Sophocles and already quoted : —

“ In swarms while wandering from the dead,
A humming sound is heard.”

In the “ Ancient Laws of Wales ” we read : —

“ The origin of the bees is from Paradise, — because of the sins of man have they left the garden of Eden. But God gave them a blessing to take into the world : they alone produce the treasures of honey and wax ; without these the mass cannot be read.”

This is the ecclesiastical version of that story of classical antiquity where the bees are fabled to have survived alone of all creatures from the time of the golden age, and to have

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brought with them from that blessed time the art of making honey.

Bees, as ministers of the Church, were not exempt from obedience to divine law.

According to a German legend, the good Lord willed that bees, like men, should rest on Sunday from their work. This command of the Creator the bees in their excessive zeal disregarded, overcome by temptation to gather the abundant honey of the red clover. As a punishment, God closed to them the blossoms of this flower, and never again were they able to gather its nectar, — a fact in nature which modern scientists have noted, but to which they have given a somewhat different interpretation.

Wax was much used in the early history of the church for other purposes than the making of candles. The followers of the new religion also had their votive images. These at first, while partaking of the magic of the pagan images, were put to a good instead of a bad use.

The devout believed that their wishes would be granted through the influence of wax images, and by means of them they gave thanks.

In Germany and neighboring countries, the form of that portion of the body affected by disease was moulded in wax and placed in the church, or in earlier times at the cross-roads, in the belief that in this way recovery would be insured.

Childless couples also made an offering of the waxen image of a child, if they could not afford one of silver, hoping thus to become possessed of offspring.

The Church was quick to take advantage of this popular custom, and received these votive images. Wherefore one finds to this day in chapels and on the altars of celebrated places of pilgrimage the familiar hands, feet, arms, and other parts of the body formed in miniature from wax.

In parts of Holland and Low Germany a fish-like form is offered as a sacrifice for the whole body.

There is a German legend repeated to this effect : —

“ Whoso offers a hand of wax
To him is healed the wound upon his hand.
And whoso offers a foot of wax
To him his foot becomes whole.”

But all too soon this simple act of faith changed to the pagan magic. The science of “Azman,” practised by means of a waxen goblin, became a wide-spread secret art.

It is said that at the ceremony of initiation in the art of Azman, the baptismal rite was performed in the most solemn manner with the use of holy water, this sacrilegious act being considered necessary to give power to the image of wickedness.

In a book written in 1455 by Dr. Hartlieb we are told : —

“One finds certain sorcerers who make Atzmana of wax and other things. They make these at certain hours and pronounce over them certain incantations and names, and hang them where they can swing freely in the air. It is believed that when the wind stirs them, the persons in whose names the images were made, shall have no rest.”

These Atzmana were immersed in water, toasted by the fire, or stuck through with needles and buried under the door-step, as well as hung in the air, it being believed that the person intended to be bewitched through the image would suffer all the torments inflicted upon it.

It was considered of great importance that the features of the person to be bewitched should be copied as accurately as possible in wax. If needles were stuck into the image, the bewitched person represented by it felt

great pain ; and if the needles were stuck into its heart or head, the bewitched person died.

There were ways of escaping from the evil threatened by the Atzman, one of which the following story from the "Gesta Romanorum" illustrates :—

A pious man went to Rome to visit Saint Peter and Saint Paul ; and while he was gone, there came to his wife a travelling scholar — as they are called — who besought her in marriage. The woman replied that her husband had gone to Rome, but if he were dead or if her companion could slay him, she would prefer him before all other men.

He replied that he could easily kill him, and went out and bought six pounds of wax and made of it an image.

As the pious man entered the city of Rome, came one to him and said, "O thou son of death, why goest thou hither and thither? If none help thee, thou wilt to-day be living and dead."

The man said, "Why should this be?"

The stranger replied, "Come to my house and I will show thee."

Then he took him home, prepared for him a bath of water, put him in it, gave into his hand a mirror, and said, "Look therein!"

And he sat by his side and read in a book and spake unto him, "Look in the mirror ; what seest thou there?"

He in the bath replied,—

"I see in my house one who places a waxen image on the wall and goes away and takes the cross-bow and bends it and is about to shoot at the image!"

The stranger replied, "If thou valuest thy life, plunge under the water when he is about to shoot."

The man did so. The other read farther in the book and said, "Look, what seest thou?"

The man replied, "I see that he has failed and is very sad, and my wife with him."

The travelling scholar, having prepared to shoot another arrow, standing only half as far away as before, the stranger again warned the man in the bath at the right moment, and he, plunging beneath the water, escaped the fatal shaft. "Look, what seest thou?" inquired the stranger as before, and the man in the bath replied, "I see that he has again failed, and is very sad and says to my wife, 'If I fail the third time, I am a dead man.'"

The scholar made ready and went close to the image that he might not fail.

Then he who read in the book said, "Plunge!"

The man plunged before the shot. "Look," said the other, "now what dost thou see?"

He replied, "I see that he has failed for the third time, and the arrow has gone into himself and he is dead and my wife is burying him under the house."

The stranger said, "Now get up and go thy way."

The man wished to reward his saviour, but the latter would not allow it and said, "Pray to God for me."

When the rescued man went home again his wife wished to receive him in a friendly manner, but he would not be agreeable to her and called in her relatives and told them the whole story. The woman denied it, whereupon he took the people to the place where she had buried the scholar and dug him up. Then they took the woman and burned her, which was her just reward.

Similar stories are found in abundance in Germany, Poland, Finland, and other northern countries.

Naturally this practice of magic by means of wax extended far beyond the churchly bounds, and we learn that the Slavic people used it in divination. The priests of the god Potrimpos, who was the fortune-bringer in war as in

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peace, the dispenser of the fruitfulness of the fields, and all household good-fortune, prophesied by means of figures formed by melted wax poured upon water.

A story is told of a mother who went to the high-priest of Potrimpos to learn the whereabouts of her absent son, and was told that he had been shipwrecked, as the wax poured upon the water took the form of a wrecked ship and of a swimming man.

It is said that the disease known as "ignis sacer," sacred fire, or pestilential erysipelas, was cured by means of wax dissolved in water.

Very naturally the magic art connected with wax images found its way to many countries, and even as far West as Scotland we learn of its currency among the people.

It seems that the Scottish king, Duff, having shown signs of wasting away, his counsellors suspected magic. A search was instituted and an old woman was finally discovered who was accused of having bound a waxen image of the king to the spit and turned it about before the fire.

Questioned upon the rack, the reputed sorceress confessed that she had intended the death of the king, which would have followed in a few days. As a punishment the sorceress was burned with her wax image, whereupon the king recovered.

The wax of young bees was considered particularly powerful in magic, and we are told of a sorceress who possessed an image of such virgin wax in which all the members were distorted excepting one rib — she believing that according to Genesis ii. 21, 22, "And the Lord caused a deep sleep to fall upon Adam, and he slept; and he took one of his ribs, and closed up the flesh thereof: and the rib, which the Lord God had taken from man, made he a woman, and brought her unto the man," she too could from this rib create more images potent for harm.

The sorceress' own life was bound up in this image, and when it was melted before a slow fire she disappeared at the same time.

The sacred candles were stolen from the churches for the unholy purposes of magic, as were also the consecrated wafers and the bones of the dead, both of which were conceived to possess exceptional power in witchcraft.

Against these sacrilegious misdemeanors the church interfered with all its power, and Pope Gregory IX. issued in 1233 a special bull wherein every one implicated in these magic arts was threatened with eternal damnation, and others did the same.

The "Ackersegen" or blessing of the field seems to be the result of a mixture of pagan and mediæval superstitions. We know the Greeks and Latins made offerings to the deities of the fields and orchards and that upon these occasions a trench was often dug and into it poured meal, milk, honey and wine or mead.

Even during the middle ages a similar custom was followed in some places when at the ploughing of the fields sacrificial rites were observed in which milk, meal and honey were offered.

There was later a special ceremony devised for those fields supposed to have been blighted by magic.

From the four corners of the field sods must be cut ; oil, honey, the milk of all cattle, the boughs of all trees, particularly of oaks and beeches, all herbs excepting burdocks, must be laid upon the sods and sprinkled with holy water. The sods must then be taken to the church, the green side turned towards the altar, and four masses read over them. They must then be returned to the field before sunset, a blessing pronounced over them, unknown seeds bought of a mendicant placed upon the plough, another blessing pronounced and the first furrow ploughed. All kinds of flour

kneaded into a loaf with milk must then be laid in the furrow and another blessing pronounced.

At one end of the furrow the ploughman must find a jar of honey, at the other end a jar of milk.

In a Wallachian legend the bee appears as a messenger of God, sent by him, when he was in the act of making the world, to the Devil to ask whether it would be better to create only one, or more, suns.

While the Devil was thinking it over, the bee placed itself upon his head and so became possessed of his secret thoughts.

The Devil concluded that if more than one sun were created the earth would be so hot that hell beneath would not be needed, or that night would be turned into day, whence the works of darkness would no longer be possible in this glare of light. He declared therefore for the creation of but one sun.

When the bee flew to take the answer back to God the Devil discovered that it had been sitting upon his head and had read his thoughts.

Then in anger raised he his scourge against the forth-flying bee, and struck it on the body. Through this blow the bee received its cut-in-two form, and the black rings on the hinder part of the body. Before this, so the legend runs, the bee, as the servant of God, had been as white as snow. The bee is yet called by the Wallachians "albina."

The following is a Servian legend.

A boy once met the Devil and after being teased and cheated by him a number of times the Devil proposed that they should tell lies for a wager.

The Devil being the oldest took the lead and told a number of preposterous stories. This did not trouble the boy, who found himself prepared with quite as remarkable answers. He told how in his youth he had examined his

father's bees every morning ; as he once passed the hives of bees in review he found the best and most beautiful queen-bee missing. So he started out to find traces of the lost one. He rode over the wide sea on a bridge, and on the other side he saw the queen-bee yoked to a plough, and a man ploughing a piece of land with her.

It is noteworthy in connection with this tale that the metamorphosis of a bee into an ox that draws the plough, and thus brings fruitfulness to the earth, was a favorite idea among the ancients.

It was a common superstition among the northern and western peoples that a child upon whom a bee settled in sleep was a child of good fortune — a lucky child.

In Finnish mythology there is an invocation to the bee, imploring it to fly far away over the moon, over the sun, near to the axis of the constellation of The Wagon, into the dwelling of the creator, God, and bring back upon its wings and in its mouth health and honey to the good, and wounds of fire and iron to the wicked.

There is a Circassian legend to the effect that divine intervention was once used to preserve the race of bees from destruction. Merime, the mother of the gods, could not protect the bees when Indras, the god of thunder, was angry with them, and they all perished but one which the goddess concealed beneath her inmost garment, and from which proceeded anew the race of bees.

When the Circassians celebrated their principal festival and brought offerings — at which no female creature was allowed to look — they repeated a prayer in which bees, honey, and wax are mentioned, from which a few sentences are here given : —

“To him who has brought an offering may God give prosperity and health ; to the children that come into the world may he give money, bread, bees, cattle in abundance ;

may he cause the bees greatly to swarm and make wax in abundance. When spring approaches, O God! let out the three kinds of cattle upon the three ways, protect them from deep mud, bears, wolves, and thieves. Like as the hop is firm and full, even so bless us with good fortune and knowledge! Even as the light shines brightly, so let us live! Even as wax in the hive increases, so grant us good fortune!"

The Poles, Silesians, and Russians generally, had a bee-god called Babilos who was credited with being the inventor of the art of bee-keeping, and the image of this god was often placed near the hives. We hear also of a Lithuanian goddess of honey called Austheia, and of another honored in the Caucasus as Meritta, while the Russian peasants consider it sacrilegious to kill a bee.

In the Russian folk-tales the bee appears as a good fairy to assist the deserving in their need, and there is a story of a bee that once changed itself, to comfort an old father, into the form of his only son, who was wandering in strange lands, and whom the father wished to see once more before dying.

There is another tale of a father who wished to choose the best one from among his twelve sons. He loved them all and feared doing injustice to any, whereupon a bee flew in and settled upon the head of the youngest as a visible sign that this was the most excellent.

A bee also undertook the grave responsibility of deciding for a young hero, who wished to choose from twelve maidens the most beautiful for his bride.

It is said the bear, as the "honey-finder" and "honey-eater," still enjoys high respect among the Russian peasants. According to an old Russian custom a vessel containing honey must be placed beside the bier upon which lies a corpse—reminding us of a similar custom among the ancient Greeks.

In northern mythology as among other nations, honey gave the gift of poetry.

The way it acquired this power is related at length in the "Younger Edda," where we learn there once lived a very wise man, Knaser, so wise that no one could ask him a question he could not answer.

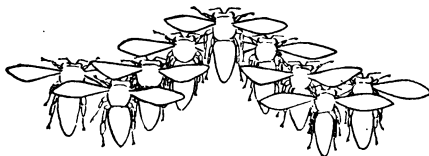
He travelled much about the world, teaching men wisdom, until he came to the house of the dwarfs Fjalar and Galar. They called him aside, saying they wished to speak with him alone, then slew him and let his blood run into two jars called Son and Bodu, and into a kettle called Odrarer. They mixed honey with the blood, and thus was produced such mead that whoever drinks from it becomes a skald and sage.

How this mead was taken from the dwarfs and finally made accessible to man one can discover by reading the "Edda."

Lorenzo de' Medici did not receive his gift of poetry from the mead of Valhalla nor from literal honey, though he needed the bees and their hive to explain the phenomenon, as Henry Morley in his "English Writers" informs us:

"Lorenzo [de' Medici] himself, in a love sonnet, tells how the gods made him poetical.

"The rays of love from the eyes of his lady penetrating through his eyes to the shadow of his heart, as rays of the sun enter the dark bee-hive by its fissure, caused the hive to awake, and fly hither and thither in the forest sipping from the flowers."



XIX

CURIOUS CUSTOMS AND BELIEFS IN MODERN TIMES

THE bees must still be told of a death in the family in many parts of Europe and in certain out-of-the-way places in our own country, where in earlier days the custom was general. It afforded material for one of Whittier's most beautiful poems, "Telling the Bees."

" Before them, under the garden wall,
Forward and back,
Went, drearily singing, the chore-girl small,
Draping each hive with a shred of black.

" Trembling, I listened; the summer sun
Had the chill of snow ;
For I knew she was telling the bees of one
Gone on the journey we all must go ! "

The song the chore-girl small was singing is this : —

" Stay at home, pretty bees, fly not hence !
Mistress Mary is dead and gone ! "

This recalls a similar prayer heard in Germany, and which may thus be translated : —

" Little bee, our lord is dead ;
Leave me not in my distress."

In England the custom of telling the bees is still general in the rural districts.

Not long since, a woman in Suffolk, when asked if she had told the bees of the death of a relative, immediately

replied, "Oh! yes, when my aunt died, I told every skep¹ myself, and put them into mourning," and in his book, "The Honey Bee," Harris says:—

"I have since ascertained the existence of the same superstition in Cornwall, Devonshire, Gloucestershire (where I have seen black crape put round the hive or on a small stick at its side), and Yorkshire."

In the "Bee Journal," under the head of "Norfolk Bee-Superstition" one writes:—

"A neighbor of mine had bought a hive of bees at an auction of the goods of a farmer, who had recently died. The bees seemed very sickly, and not likely to thrive; when my neighbor's servant bethought him they had never been put in mourning for their late master. On this he got a piece of crape and tied it to a stick, which he fastened to a hive. After this the bees recovered; and when I saw them they were in a very flourishing state—a result which was unhesitatingly attributed to their having been put into mourning."

An Oxfordshire woman, according to the "Bee Journal," a few years since declared that her grandfather had seventeen hives of bees at the time of his death, and because no one told them of his demise every bee died.

In a "Book about Bees" by Jenyns we find this interesting anecdote.

"The Rev. George Raynor, the well-known bee-keeper, has given me the following story:—

"An 'old lady' in this parish, whose husband died a short time ago, was 'about to put her bees in mourning' when I dissuaded her, showing her how foolish was the idea that the bee could understand anything about the death. During the following winter the bees died.

"I was never forgiven, although I offered more bees to

¹ Hive.

the manes of the departed husband. I was greeted with —

“‘It’s all very good o’ you, sir, but they ain’t like t’other poor dears as is dead and gone!’”

In Yorkshire the bees are invited to the funeral.

In the Carolina mountains of the United States the people still “tell the bees” of a death in the family; as one of the mountaineers recently described it, “You knock on each hive, so, and say, ‘Lucy is dead.’”

In some parts of France the hives are put into mourning when one of the family dies, and the inhabitants of the Pyrenees have a custom of burying an old garment belonging to the deceased under the bench where the bee-hives stand, and they neither sell, give away nor exchange the bees of the dead.

There is a wide-spread superstition that it is unlucky to buy the bees of a dead man, while in some parts of England, Germany, France, and the United States it is considered necessary to move the hives upon the death of the owner, either to change their place or to turn them around, a custom said also to be practised in China.

The faith with which this belief was held in England is illustrated in the following, quoted by Harris from a book written in 1621:—

“Who would believe without superstition (if experience did not make it credible) that most commonly all the bees die in their hives if the master or mistress of the house chance to die, except the hives be presently removed into some other place? And yet I know this hath happened to folk no way stained with superstition.”

Sometimes this disturbing of the bees is received ill-naturedly and causes trouble at the house of mourning. Jean Paul recounts a mishap of this nature at the funeral of a man of high rank, where the obsequies were being

conducted with the greatest state and ceremony when forth rushed the outraged inhabitants of the disturbed hives and fell upon the assembly with such fury that all took to flight. They stood not upon the order of their going—but went.

In Westphalia there is a pretty custom of telling the bees the happy events of the family as well as the sad ones, and the newly-married couple going to their new home must introduce themselves to the bees, or else their married life will be unfortunate.

It seems this custom is rather wide-spread, and the following introduction of the young couple to the bees has a very merry swing.

“Imen in, imen ut,
 hir ist de junge brut.
 Imen um, imen an,
 hir ist de junge man.
 Imekes, verlatt se nitt
 wann se nu mal kinner kritt!”

In the folk-songs of the Poles is a ditty said to be sung at Polish peasant weddings while mead is drunk around the circle:—

Industrious as the life of the bee
 Is the life on the farm,
 And sweet as honey
 Is the married state.

In some northern countries honey was used in extravagant profusion at weddings, as Bergius in his book upon sweetmeats relates of the daughter of a certain Swedish person of note who in 1500 A. D. used half a ton of honey at her wedding. And in 1567 at Sigrid Sture's wedding 453 cans of honey were used.

In Brittany the bee hives are decorated with pieces of scarlet cloth at a wedding, the people believing that unless

the bees are allowed to partake in the rejoicings they will go away.

For bees to leave their home without good cause portends the near death of their owner. It is also considered unlucky for bees to swarm upon dead wood, as for instance a post, a dead tree, or the dead branch of a living tree. In some places this means that the bees themselves will perish, in others that a death will occur in the family within a year.

It is a common superstition that ill-fortune attends the killing of bees.

It is a widespread superstition that bees must not be bought with money but must be exchanged for some product of nature, though in some parts of England bees may be bought with gold. Hence in many places the usual price of a swarm of bees is half-a-sovereign, to be paid in gold.

One starting bee-keeping in Germany should begin with the lucky number of three hives, and he prospers best who buys the first swarm, has the second given to him, and finds the third. But in England it is unlucky to buy the first stock, which should always be given, the custom being to offer something, as a small pig, in return.

He who steals bees steals from himself good luck, as stolen bees never prosper.

In Bavaria and other places bees must not be bought or transported on Friday, which is considered an unlucky day.

Moreover, bees will not prosper in a quarrelsome family, and particularly if there are dissensions between husband and wife.

Nor do they thrive in time of war.

There is in Germany a superstition that the bees will die if a nail from a coffin is laid in their hive, or driven into it.

It is also unlucky to dream of bees, as he who does so will have a quarrel.

Sometimes to dream of bees, however, signifies a fire, and if bees settle on a house it is a sign that it will soon burn down.

There is, as we remember, a similar Greek superstition, and among the ancient Hindus it was considered a matter for long-continued sacrifice if a swarm of bees settled on a house.

Numerous appeals or prayers, as in the middle ages, are still in use imploring the swarming bees not to fly away, or if they have flown to come back again and supply the usual stores of honey and wax.

In Cornwall the people call "Brown, Brown," when their bees swarm, believing the goblin Brown will prevent the bees from leaving.

In Monmouthshire, England, the peasantry are said to entertain so great a veneration for their bees that they go to the hives on Christmas eve at twelve o'clock in order to listen to their humming. The bees are believed to make a much more agreeable music than at any other time, since they celebrate in the best way they can the morning of Christ's nativity.

Sheep and bees were considered sure sources of wealth, hence, —

"Who shall keep well sheep and been,
Sleep or wake, their thrift comes in."

Embalming the dead in honey seems still to be practised, for the Burmese preserve bodies temporarily in honey during the rainy season when it is difficult to get the fire necessary for cremation.

The relation between bees and love in the modern world is, like the bees in the Hindu myths, connected with the

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moon, though it is probable the present "honeymoon" bears no relation to the Hindu satellite and its myths.

The orbit of the modern honeymoon is by common consent agreed to be one of great and non-astronomical eccentricity, to which Hood thus does justice:—

"The moon, the moon, so silver and cold,
Her fickle temper has often been told —
Now shady — now bright and sunny;
But of all the lunar things that change,
The one that shows most fickle and strange,
And takes the most eccentric range,
Is the moon — so called — of honey!"

Bees appear frequently in modern love-songs, and Chaucer in the "Miller's Tale," describes a lover's wooing during which

"He syngeth brokkyng as a nightingale,
He sente hir pyment,¹ meeth² and spiced ale."

In the same tale the enraptured swain exclaims, —

"What do ye, hony comb, sweete Alisoun,
My faire bryd, my sweete cynamome?"

While Spenser in the "Fairy Queen" gives us anything but a sunny picture of the condition induced by Kama and Cupid, —

"True be it said, whatever man it said,
That love with gall and honey doth abound;
But if the one be with the other weighed,
For every dram of honey therein found
A pound of gall doth over it redound."

In a different vein Shakespeare in "Henry IV." makes Falstaff cry out to the Prince, —

"And is not my hostess of the tavern a most sweet wench?"

¹ Wine and honey.

² Mead.

To which the jovial Prince replies, —

“As the honey of Hybla, my old lad of the castle.”

In Tennyson’s “Foresters” when Robin offers to caress her, Marian says, —

“Quiet, good Robin, quiet !
You lovers are such clumsy summer-flies,
For ever buzzing at your lady’s face.”

To which Robin gallantly replies, —

“Bees, rather, flying to the flowers for honey.”

Upon which, to her lover’s displeasure, Marian sings, —

“The bee buzz’d up in the heat.
‘I am fain for your honey, my sweet.’
The flower said, ‘Take it, my dear,
For now is the spring of the year.
So come, come !’
‘Hum !’
And the bee buzz’d down from the heat.

And the bee buzz’d up in the cold
When the flower was wither’d and old.
‘Have you still any honey, my dear ?’
She said, ‘It’s the fall of the year,
But come, come !’
‘Hum !’
And the bee buzz’d off in the cold.”

Jean Ingelow has given us a dainty picture of two lovers :—

“An empty sky, a world of heather,
Purple of foxgloves, yellow of broom ;
We two among them, wading together,
Shaking out honey, treading perfume.”

We remember Anacreon’s pretty conceit about Love and the bee-sting, and we find Lessing in one of his poems

modifying it somewhat : — As Love lay sleeping in the Golden Age upon a bright flower-field a bee lying in a rose leaf stung him. This modern Amor 'did not run crying to Venus but became wiser for what had happened. He lurked in roses and violets and when a maiden came to pick he flew out as a bee — and stung her !

“Luxury is an enticing pleasure, a bastard mirth, which hath honey in her mouth, gall in her heart and a sting in her tail,” says Quarles, using an ancient form of thought with which we are already familiar and which seems as much a favorite with the modern as with the ancient writers.

Dr. Watts thus uses an equally well-known figure in one of his lyrics, —

“The rills of pleasure never run sincere ;
(Earth has no unpolluted spring,)
From the curs'd soil some dang'rous taint they bear ;
So roses grow on thorns, and honey wears a sting.”

It was Dr. Watts too who composed the most popular of all bee-songs, one with which every child is familiar.

“How doth the little busy bee
Improve each shining hour,
And gather honey all the day
From every opening flower !”

Naturally many of our modern poets agree with Horace and Martial in extolling solitude, accompanied by bees, as where Samuel Rogers says, —

“Mine be a cot beside the hill ;
A beehive's hum shall soothe my ear ;
A willowy brook that turns a mill,
With many a fall, shall linger near.”

Keats in his sonnet “O Solitude ! If I must with thee dwell,” sings : —

" Let me vigils keep
 'Mongst boughs pavilioned, where the deer's swift leap
 Startles the wild bee from the foxglove bell."

The bee is as much at home in modern literature as in ancient, and it would be difficult to find a poet who has not given it place in his song.

In "Paradise Lost" Milton finds room for it : —

" Awake ! the morning shines, and the fresh field
 Calls us ; we lose the prime, to mark how spring
 Our tended plants, how blows the citron grove,
 What drops the myrrh, and what the balmy reed,
 How nature paints her colors, how the bee
 Sits on the bloom, extracting liquid sweet."

Modern poets, as we have already seen, do not scorn the conceits of the ancients, and Holmes in his song on Bryant's seventieth birthday gives a new dress to Martial's epigram of the bee entombed in amber.

" In his own verse the poet still we find,
 In his own page his memory lives enshrined,
 As in their amber sweets the smother'd bees, —
 As the fair cedar, fallen before the breeze,
 Lies self-embalmed amidst the mouldering trees."

Tennyson in "Eleänore" thus beautifully uses the poetical conception so common to the ancient writers, of favored ones being fed in infancy by the bees : —

" Or the yellow-banded bees,
 Thro' half-open lattices
 Coming in the scented breeze,
 Fed thee, a child, lying alone,
 With whitest honey in fairy gardens cull'd —
 A glorious child, dreaming alone,
 In silk-soft folds, upon yielding down,
 With the hum of swarming bees
 Into dreamful slumber lull'd."

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But there is a pleasure in the bee for its own sake that is modern and that bursts forth as joyously as did the song of the bee, among the old Hindus.

An English poet sings : —

“The wild bee reels from bough to bough
With his furry coat and his gauzy wing,
Now in a lily cup, and now
Setting a jacinth bell a-swing,
In his wandering.”

And thus Emily Dickinson : —

“His labor is a chant,
His idleness a tune.
Ah, for a bee's experience
Of clovers and of noon !”

Nora Perry sings : —

“So sweet, so sweet the roses in their blowing,
So sweet the daffodils, so fair to see ;
So blithe and gay the humming-bird a-going
From flower to flower, a-hunting with the bee.”

In his “Ode to Delia” Burns sings : —

“The flower-enamoured busy bee
The rosy banquet loves to sip.”

While in “Tam O'Shanter” Maggie the mare runs for her life, —

“As bees bizz out wi' angry fyke,
When plundering birds assail their hyke.”

But it is in Burns' poem “Thou Fair Eliza” that one of the prettiest of modern bee-adorned stanzas is found.

“Not the bee upon the blossom,
In the pride o' sinny noon ;
Not the little sporting fairy,
All beneath the summer moon ;

The Honey-Makers

Not the minstrel, in the moment
Fancy lightens in his e'e,
Kens the pleasure, feels the rapture,
That thy presence gives to me."

Very naturally the superstitious belief in bees as augurs extended far and wide, and it has persisted even to modern times. When at a Polish election of kings a swarm of bees settled upon the banner of Woiwoden Wisniowicky this turned the election in his favor.

On the other hand, the sudden settling of bees upon the weapons of Duke Leopold III. of Austria, on the day before the battle of Sempach, was considered an evil omen.

In Woodward and Burnett's "Heraldry" we read the following interesting account of the origin of the well-known "bees of Napoleon."

"Bees are often used in armory as an emblem of industry and perseverance as well as in allusion to the name of the bearer.

"The Emperor Napoleon replaced the proscribed fleur-de-lis by golden bees, which he used as decorations for his coronation robes, and also employed in the heraldic augmentations hereafter to be described.

"The origin of the assumption of the bees by Napoleon as an imperial badge is curious. In the year 1653, there was discovered at Tournay a tomb supposed to be that of Childeric (died 480), father of Clovis.

"Among the precious articles enclosed therein, or found in proximity to it, were about three hundred small objects of gold and fine stones, which somewhat resembled in shape an insect, to which the name of 'bees' was given. These and the other contents of the tomb were presented by the Archbishop of Mentz to Louis XIV., and were long preserved in the Bibliothèque Royale at Paris. These so-called bees were stolen in 1832, and only two remain at the present day.

"Among those who were present at the discovery was Jean Jacques Chifflet, at that time physician to the Archduke Leopold, Governor of the Netherlands. Chifflet was charged by the Archduke to write an account of the discovery, and in his opinion these golden insects had been employed as the decorations of the royal mantle (Childeric's), which very possibly was the case. But Chifflet went further and declared that in these insects was to be found the origin of the fleur-de-lis. This statement occasioned a great literary controversy, and the assertion was very hotly contested by Tristan de St. Armand (*Traité du Lis*, 1656), and later by that celebrated antiquarian Montfaucon, in his great work.

"The Emperor Napoleon, whose ambition it was to pose in some sort as the successor of princes anterior to the line of Capet, assumed these bees as the badge of his new empire, and, as has been stated, caused them to be largely employed among its heraldic insignia."

These bees appear upon Napoleon's coronation mantle and upon that of the Empress Josephine, as well as in tapestries and other decorations of the imperial palace.

They appeared upon the imperial arms and the arms of those high in office, and replaced the lilies of France in the arms of Paris and other French cities.

Later these bees were looked upon by some of Napoleon's followers as omens of evil.

Bees appear on the coats of arms of many European families and "Beehives with bees flying around them occur in some very modern coats, and, though improperly, as crests."

A beehive stands over the entrance to Brigham Young's house, and the same symbol is to be seen everywhere throughout Salt Lake City, expressive of Mormon thrift and industry.

In India the bee is still an object of interest, and we are told that because Krishna changed an earthly maiden beloved by him into a certain plant (*Ocimum nigrum*) and commanded that he should never be worshipped without the presence of this plant, the Indians to this day hold leaves of it in the hand when they remove the honey from the hives — believing the god Krishna to be present in the bees.

Bees from very early times have enjoyed a reputation as weather prophets. And this is far better deserved than most of their attributes of divination, as it is evident to any one who watches them that they fly not far from home when a storm is brewing, even though to mortal senses there may be no sign of atmospheric disturbance.

This was well known to the ancients and concerning it Aristotle says : —

“Bees discover the approach of cold weather and of rain; this is plain, for they will not leave the hive, but even if the day is fine, are occupied in the hive. By this the bee-keepers know that they expect severe weather.”

And Virgil in the “Fourth Georgic” : —

“Nor do they remove to a great distance from their hive when rain impends, or trust the sky when east winds approach; but in safety supply themselves with water all around under the walls of their city, and attempt but short excursions.”

It is a common superstition dating from the time of Pliny, or probably long before, that bees cannot endure an echo and will not remain in a country where echoes are common.

They are not, however, considered averse to all noises, as we know.

The ringing of church bells is believed to give pleasure to the bees, wherefore one can, by pounding on metal

instruments, restrain them when swarming, and induce them to settle instead of flying away.

The belief that bees can be stopped by noise was common in the time of Aristotle and is thus referred to by him :

“Bees also appear to have pleasure in noises, so that they say that they collect them into their hives by striking earthen vessels and making noises.”

Observe the caution with which Aristotle makes the statement and he immediately adds :—

“But it is very doubtful whether they hear or not, and if they hear whether they collect together from pleasure or from fear.”

Evidently the mental characteristics of the scientist have in no wise changed since the time of Aristotle — only time has revealed somewhat more accurate methods for finding results.

The real origin of the wide-spread belief that a loud noise will prevent the bees from leaving is somewhat obscure. It is not improbable, however, that the custom of making a noise arose for very utilitarian reasons, with which the weapon-dance of the Curetes and the church bells alike had nothing to do, these being later fictions to account for a primitive custom.

A swarm of bees is easily lost, as it flies swiftly, and at the departure of one the ringing of bells or otherwise making a din would put everybody on the guard to track it. Also, if the neighbors were notified of the leaving of a swarm they would know to whom it belonged if it came to them and would have an opportunity of restoring it.

Whoever loses a swarm of bees is at liberty to follow them wherever they go, and “by one of the laws of Alfred the Great all keepers were bound to ring a bell when their bees were swarming, to give notice to their neighbors of the fact.”

Mirrors and bright tin pans are in some places used to reflect the sun upon the swarm, which, it is believed, will cause it to settle instead of flying away.

Although the bee has a reputation for exceeding great virtue and is said to loathe dishonesty in man to such a degree that it will pine and die under the care of a dishonest keeper, the facts do not wholly warrant the fable, for it is well known that during a period of scarcity it will steal the stores of other bees if it can get a chance. In fact the robbing propensity of bees is one of the difficulties of bee-keeping. There used to be a way of controlling this, however, and that was by the magic use of the gimlet. If one turned this instrument forward in the wood or straw of which the hive was made, at the same time naming the three highest names, he could drive his own bees to successful robbery; if he turned it backwards he could thus prevent stranger bees of thieving intent from entering his hives.

Another preventive to robbery is to fasten the windpipe of a marten or polecat at the entrance hole to the hive, in such a way that the bees must pass it in going in and out. It has the power of checking the course of the robber bees.

The smoke of wormwood grown in a graveyard is also believed to be an efficient deterrent against robbers.

Thieving bees are not the only enemies to the hives, however. Toads are fond of a meal of bees, and in Pomerania a so-called toad-stone is placed under the hive to banish these nuisances; while as a charm against honey-stealing ants, fish spawn in some places is put near the entrance hole.

A truly beautiful relation exists between the German bee-keeper and his little subjects which is well expressed by his name of "bee-father."

A very pleasing custom still lingers in parts of Germany,

practised at the time the honeycombs are taken from the hives.

Then the bee-father sends honey as a gift to his neighbor, for the bees have collected their sweets in part from the neighbor's flowers. If this poetic act of justice is omitted the bee-father is punished by a poor honey-harvest the next season.

Sick bees and empty combs are also the punishment of that unworthy bee-father who refuses honey to the sick, while he who withholds honey from children sins against Mary the mother, and Joseph the foster-father of the child Jesus.

The idea of purity in connection with the bee extended to its keepers, and Moffett only expresses the opinions of the ancients when he says, —

“Furthermore, to keep these good pay-masters, and to make them in love with you, you must remove from their Hives mouthes, unlucky, mischievous, and deceitful people, and idle persons that have nothing to do, causing them to stand further off.” All unclean people, odors and objects were considered obnoxious to the bees, and the superstition still lingers in some places, so that when the bee-father is about to remove the combs he must first clean and purify his own body. He must for several days refrain from strong-smelling food, as salt meat, sea fish, onions and garlic. He must use no salves and drink no intoxicant.

It is also unwise to wear a red garment when going to the bees, as it is said they will think you a “murderer or man of blood,” and in some places it is said that bees will sting any red-haired person who comes near the hives.

No doubt the bees learn to know — and may it not be to feel a regard for — their human companions. The close relation between the master and his bees has not escaped

attention, and many stories are told of the influence of the one over the others. Chief among these perhaps is that of the bees of Saint Medard that, we remember, compelled the thief who had stolen them to restore them and make reparation.

Certain bee-keepers are known to have possessed a remarkable influence over their bees.

Menzel tells of a singular exhibition of affection on the part of bees, said to have occurred at Nantes in 1777. A woman who had been faithful to her bees fell ill, whereupon her little friends came in swarms from their distant hives and flew into her house and her room.

A better accredited account is that of the English bee-keeper Wildman, who himself explains the secret.

"When under a strong impression of fear," Wildman says of the bees, "they are rendered subservient to our wills, to such a degree as to remain long attached to any place they afterwards settle upon, and will become so mild and tractable as to bear any handling which does not hurt them, without the least show of resentment. Long experience has taught me, that as soon as I turn up a hive, and give some taps on the sides and bottom, the queen immediately appears. Being accustomed to see her, I readily perceive her at the first glance; and long practice has enabled me to seize her instantly, with a tenderness that does not in the least endanger her person. Being possessed of her, I can, without exciting any resentment, slip her into my other hand, and, returning the hive to its place, hold her till the bees, missing her, are all on the wing, and in the utmost confusion."

When in this state he could make them alight wherever he pleased; for on whatever spot he placed the queen, the moment a few of them discovered her the information was communicated to the rest, who in a few minutes were all

collected round her. In this way he would sometimes cause them to settle on his head, or to hang clustered from his chin. Again, he would transfer them to his hand, or to any other part of his body, or would cause them to settle on a table, window, etc. Prior to making his secret generally known, he deceived his spectators by using words of command ; but the only magic he employed was to summon into activity the strong attachment of the bees to their queen.

Cautioning his readers as to attempting what he himself accomplished only by long experience and great dexterity, Wildman concludes his account with a parody of the reply of C. Furius Cresinus, a liberated Roman slave, who, being accused of witchcraft in consequence of his raising more abundant crops than his neighbors, and therefore cited before a Roman tribunal, produced his strong implements of husbandry. his well-fed oxen, and a hale young woman, his daughter, and pointing to them, said, " These, Romans ! are my instruments of witchcraft ; but I cannot show you my toil and anxious cares." " So," says Wildman, " may I say, These, Britons ! are my instruments of witchcraft ; but I cannot show you my hours of attention to this subject, my anxiety and care for these useful insects ; nor can I communicate to you my experience, acquired during a course of years."

We hear of naked priests in India who live in the forests alone with the bees and are continually swarmed over by them.

There is a story of a negro whom the bees accompanied wherever he went, and who, like Wildman, could wear them as a cap upon his head ; and of a Pole whose every motion the bees obeyed.

In short, similar stories are innumerable, and doubtless it is true that the operator has possession of the queen-bee ;

yet there are some among us who could not with impunity handle a swarm of bees even under these circumstances.

There is no doubt that bees are friendly to some and unfriendly to others, the exact cause for their likes and dislikes being as inscrutable perhaps as the affinities and repulsions which people oftentimes feel for each other.

By some it is believed that the possession of certain herbs will attract bees to an individual. The belief in the influence of these herbs upon bees is widespread.

There is a European plant, variously called Melia, Melissa, Melittis, Melianthus and Honey-blossom, though probably it is *Melissa Officinalis* or our common Bee Balm, which was formerly believed to have the power of drawing bees to the hive where it was placed.

It is noteworthy that in Germany the plant believed to entice bees to the hive is also called Mutterkraut (mother herb) and is considered healing to mothers.

There is another curiously suggestive superstition connected with this plant, which is that he who carries it with him can lead cattle wherever he wishes.

The nymphs, as we know, and sometimes the muses, had their origin in bees, — whence in latter times came the legend that good and industrious women also had their origin in bees, and certain names of women are still in vogue whose original significance may have been derived from the legend.

Melissa, as a name for women, no doubt had originally the meaning belonging to the word in Greek mythology, though few of the Melissas of to-day suspect the significant and complimentary character of their name as used by the Greeks of antiquity.

In French we have Mélisse and Mélite, modifications of Melissa.

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Deborah, too, as we remember, in Hebrew means bee, or "she that speaketh" — not as a nymph this time, but as a prophetess. We still retain the name of Deborah, but it is no longer significant of prophecy.

Although the prophets of our day are popularly represented as having "a bee in the bonnet" this by no means implies that we consider them possessed of the divine frenzy of the ancient seers!

As in the Eastern world so in the Western, we find many cities showing by their names the importance of their bees, as Immendorf, Immenstadt, Immenhausen, Immenstaed, Immenstedt, Immendingen, Immnitz, etc., from *Imme* a bee, and in Texas there is a town called Beeville.

The College of Bees at Oxford University, according to Butler's "Feminin Monarchi," was "so called by the founder in the statutes," and he adds, "whereupon Erasmus to the first president inscribeth his epistle thus: —

"Erasm. Rot. Joanni Claymundo. Collegii Apum Præsidi."

Butler also tells the following interesting story in connection with this college.

"When, in A. D. 1520, Lodovicus Vives was sent by Cardinal Wolsey to Oxford, there to be the public professor of Rhetoric, being placed in the College of Bees, he was welcomed thither by a swarm of bees: which sweetest creatures, to signify the incomparable sweetness of his eloquence, settled themselves over his head, under the leads of his study; where they have continued above one hundred years.

"The truth of this story appears as well by the general voice of the house, which have received it by tradition; as by the special testimony of a worthy Antiquari of our time: who affirms that he hath often heard his master, D.

Benefield (one of the public professors of Divinity) who then had L. Vives' chamber and study; and D. Cole (then President, and in Q. Mari's days scholar of this house) to say as much, calling the bees Vives' Bees.

"In the year 1630, the leads over Vives' study, being decayed, were taken up and new cast; by which occasion the stall was taken, and with it an incredible mass of honey. But the bees, as presaging their intended and imminent destruction, (whereas they were never known to have swarmed before) did that spring (to preserve their famous kind), send down a fair swarm into the president's garden. The which, in the year 1633, yielded two swarms; one whereof pitched in the garden for the president; the other they sent up as a new colony into their old habitation, there to continue the memory of this mellifluous Doctor, as the University styled him in a letter to the Cardinal."

Quite carried away by these honeyed happenings, Butler thus concludes: —

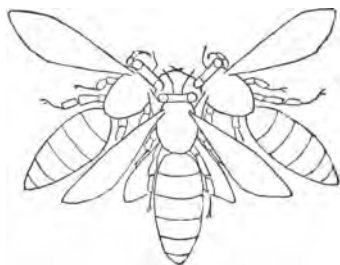
"How sweetly did all things then concord; when in this neat museum, newly consecrated to the muses, the muses' sweetest favorite was thus honoured by the muses' birds?"

"The Bee" is a common name for periodicals, as, for instance, the "Omaha Bee," a daily newspaper, and the "Tryon Bee," a semi-weekly sheet. But the most interesting of these is undoubtedly "The Bee" of Oliver Goldsmith, a weekly paper conducted and wholly written by its gifted editor. The first number came into circulation October 6th, 1759; but a single bee cannot do the work of a hive, so it is not surprising that Goldsmith's "Bee" ended its existence November 24th, 1759, having, like the true honey-bee in a season of abundant honey-flow, worked itself to death in about six weeks.

A very interesting Order of the Bee was that founded

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in 1703 by Louise, wife of Louis Augustus de Bourbon, the gold medal of which bore upon one side the likeness of the princess, upon the other a bee, with the significant inscription, "Je suis petite, mais mes piqûres sont profondes."



XX

BEE-CULTURE AT PRESENT

FROM the time of Pliny in the second century of our era to that of Swammerdam in the middle of the seventeenth century nothing of importance was written upon the natural history of bees. Then come Réaumur, Linnæus, De Geer, Bonnet, and at the close of the eighteenth century Latreille and Lamarck, and a little later Cuvier. These with a few others did the important original work necessary to the elucidation of the world of nature and incidentally of bees. But there were popular writers and practical bee-keepers who from the seventeenth century to the present time have added their contributions, more or less valuable, to the literature of natural science.

In the time of Bonnet lived a unique figure, the Genevese, Francis Huber, who devoted much of his time to the study of the bee and made several discoveries, so remarkable that they exposed him to the ridicule of many in his own time, but which since have been proven and accepted by the scientific world.

Huber's story is the most romantic in the annals of the naturalists, for, born of good and talented parents and pursuing too arduously the delightful paths of knowledge open to him, at an early age he became blind. Since his interest was mainly in the world of nature this would have seemed to many an insurmountable affliction. Not so to Huber. Possessed of a particularly genial and childlike nature, he was able not only to overcome the drawbacks inci-

dent to his infirmity but perhaps even to turn them to his advantage. Deprived of his physical eyes, he focused the vision of his mind upon the problems he set himself to solve, and to a remarkable extent solved them. He was fortunate in two particulars.

The girl he loved did not desert him in his time of need. Against the wishes of her friends and relatives she persisted in becoming the wife of the blind man, and was his sympathetic helper and consoler through a long and happy union.

Besides his wife he had a faithful servant, Francis Burnens by name, who with incalculable patience and thoroughness conducted the experiments and made the observations necessary in the investigations of his blind master, and to a great extent was responsible for his brilliant successes.

Huber was one of the first to use successfully glass hives for the purpose of observing the actions of the bees, and he invented one that preserved the normal condition of the swarm almost perfectly.

As long ago as the time of Pliny attempts were made to watch the bees through transparent walls, and he tells us that many persons had hives made of "*lapis specularis*" — probably a sort of talc — for this purpose, and elsewhere he speaks of "a man of consular dignity near Rome, whose hives were made of transparent lantern horn."

Although many interesting discoveries about bees had been made by the beginning of the nineteenth century, it is interesting to note that the views of Aristotle and Pliny continued to be held by the people even as late as the middle of the century. The modern scientists were not able to displace the theories of their brilliant predecessors in the minds of the people until their work was corroborated by overwhelming evidence from many sources, and gradually became the property of all classes.

There is at the present time a long list of books about bees suited to the average reader, many of which are admirable.

No great general progress was made in practical bee-keeping until within about fifty years. In that time the methods of handling bees and honey have taken immense strides, so that bee-keeping to-day is more scientifically practised than ever before, and probably there is more honey harvested to-day than ever before.

It is only in Europe and North America, however, or in countries colonized by Europeans or Americans, that the bee is scientifically cultivated. The whole world owns the bee, but the whole world has not yet learned how to profit to the utmost by its possession. Wherever flowers bloom bees hum. From the frozen regions to the equator they are the companions of the flowers. All civilized peoples keep them and have done so from remote ages, and many semi-civilized races hive and care for them.

The genus *Apis* supplies the most valuable honey-bees to the world, and to this genus belong the domesticated bees of Europe, Asia, Egypt and North America.

Apis Mellifica is the species best known to us, and varieties of this bee have now been introduced into nearly all parts of the world.

In India, however, where the bees are as highly valued by the people to-day as when Kalidasa gave them such frequent place in his love songs, *Apis Mellifica* is not indigenous. Indeed, India has four or more species of honey-making bees, though but one of these, the *Apis Indica*, is kept in hives. The others live in rocks or trees and store quantities of "wild honey," which the natives gather.

The most famous of the wild honey-bees of India is the large *Apis Dorsata*, found also in the adjoining countries.

It is said to be a fierce wild bee, and builds an enor-

mous single comb, sometimes five or six feet long and three or four feet wide, suspending it in the tops of the highest trees, or beneath overhanging rocks, or in ruins or other inaccessible places. Sometimes, under favorable conditions, it builds a double comb, and as many as fifteen or twenty swarms may occupy one favorite tree.

Honey in India is in many places under government control, only certain persons or "honey-men" being granted a license to gather it.

The honey and wax of the *Apis Dorsata* are eagerly sought in spite of the difficulty and danger of securing them. Into the forest the honey-men steal twice a year at the darkest part of the night and climb the high trees by means of bamboo ladders, the branches lopped off to serve as steps, or they are let down by ropes over the high cliffs. One comb is said to yield on an average from eight to fifteen "beer-bottles" of reddish-brown honey, and from one to two-and-a-half pounds of wax, and this is considered a plentiful harvest, well worth the cost of gathering.

Hooker in his "Himalayan Journals" speaks of the honey-seekers in one of the valleys he visited:—

"The slope on either side of the valley is very steep; that on the north in particular appearing too precipitous for any road, and being only frequented by honey-seekers, who scale the rocks by cane ladders, and thus reach the pendulous bees'-nests, which are so large as in some instances to be conspicuous features at the distance of a mile. This pursuit appeared extremely perilous, the long thread-like canes in many places affording the only footing, over many yards of cliff: the procuring of this honey, however, is the only means by which many of the idle poor raise the rent which they must pay to the Rajah."

The honey of the *Apis Dorsata* is said not to be of excellent quality, being thin and liable to ferment and mixed

with all sorts of impurities, a condition which is partly or perhaps wholly the result of carelessness in handling. It is consumed mostly by the natives. The wax, however, is excellent and valuable, and is produced by the bees with great prodigality.

The size of the honeycomb cells corresponds to the size of the bee, which is much larger than our honey-bee.

These strange, wild, tree and rock building bees of India have a peculiar interest for us, as an attempt has already been made to bring them to this country, and the time may come when from the trees of our Southern States will depend these large combs. .

Mr. Frank Benton, in 1880-81, made a trip to India on purpose to get swarms of the big bees. Although they never have been tamed by the natives of India, the enterprising American succeeded in inducing them to live in hives and found them no more difficult to handle, by using proper precautions, than other bees.

The climate defeated the enterprise, however, and a long illness on the part of Mr. Benton, while trying to transport the bees, resulted in the loss of them.

The presence of *Apis Dorsata* is desired by the bee-keepers of this country because of its large size and consequently long tongue. Undoubtedly it could collect the honey from the deep flowers of red clover, which are, as a rule, inaccessible to our honey-bee. At present a great part of the delicious honey in these flowers goes to waste for want of gatherers, only the bumble-bees being able to profit to any extent by the luscious store.

It is not improbable, however, that the red clover may be replaced before long by the new clovers which have been developed by careful experiments and which combine the excellent qualities of both the red and the white clover as forage-plants. Experiments in producing new

forms of clover may well result in depriving the bumble-bee of his monopoly by giving us clovers with tubes short enough for our ordinary hive-bee.

This, however, need not discourage the introduction of *Apis Dorsata*, as certainly there will be plenty of honey for all gatherers. It is a question, though, whether the *Apis Dorsata*, being a tropical bee, could endure the northern climate without a great deal of care ; it might take to the woods in the South, however, and build its enormous combs of valuable wax, which would be worth seeing, to say the least.

Besides possessing the largest of honey-makers, India also possesses one of the smallest, — the little *Apis Florea*, of which "the workers, more slender than house flies, though longer bodied, are blue-black in color, with the anterior third of the abdomen bright orange."

This little bee builds an exceedingly delicate comb no larger than a man's hand and attaches it to thorn bushes or the twigs of small trees. It holds only about a teacupful of honey and this is not held in very high esteem excepting for medicinal purposes in some sections.

The common hive-bee of India is *Apis Indica*, a pretty little yellow creature, smaller than our hive-bees and producing in comparison but a meagre amount of honey, though this is usually of good flavor. It is found wild in hollow trees and rock crevices, and is easily hived.

Honey-gathering in the jungles of southern India results in the accumulation of quite a large amount of honey and wax, but bee-culture is not practised south of the Punjab excepting in some of the hill villages of Kanara, where the people desiring honey place an earthen pot with a small hole in the side, mouth down, in a hole in the ground, and trust that it will become the selected quarters of bees !

Strange to say it often does. Bee-culture is quite exten-

sively carried on in certain valleys in the hills of the Punjab. In some of these places the hives are of mud, in the form of cylinders, larger at one end. The bee-keeper makes a hole in the wall of his hut and into it inserts the larger end of his mud hive. He then closes the large opening with a sort of door made of grass and mud and closes the other end also, leaving but a small entrance hole. He is now ready for business and by smearing this curious hive with honey and other aromatic substances he hopes to call to it a swarm of bees. If they do not come he is obliged to go to the forest and capture them. When he wishes to take out the honey he retires to his hut, opens the large end of the hive, drives the bees by means of smoke out through the opposite entrance and helps himself.

In the Simla hills, however, bee-culture has assumed large proportions. It is carried on in most of the valleys, where special houses are built for the bees, sometimes three stories high. Recesses are built into the walls of these bee-houses, each closed on the outside by a wooden panel in which a hole for the entrance of the bees is made. A man is usually in charge of each bee-house, whose business it is to prevent excessive swarming, keep the apiary well stocked with early swarms and guard it against attacks of bears, martins, hornets, wasps, and caterpillars.

The bees are invited to these places by smearing the inside of the recesses with honey and aromatic herbs, and where they fail to appear the bee-keeper is obliged to go to their nests in the forest and use more urgent measures with them.

In some places there are nooks reserved for the bees in the lower parts of the people's houses, and in others bees are kept in the upper verandas of the houses in hives formed of short lengths of hollow trunks of trees.

The honey of India varies at different seasons of the

year, being watery and yellow early in the season and of good quality in the fall.

It is said that the Punjab-Himalaya honey is principally used in the manufacture of an alcoholic liquor. This the natives prepare by mixing equal quantities of honey and water together and leaving it to stand in closed earthen vessels for a year.

This Indian mead is very potent, one cupful being enough to produce intoxication.

Honey here as elsewhere forms the basis of several popular remedies and has long held an important place in the Hindu *Materia Medica*.

Egypt still values the honey-bee, and though the ancient dynasties have passed away, the descendants of the bees of Menes survive and continue to gather nectar from the flowery banks of the sacred river.

Concerning the bee in Egypt a modern writer has a word to say.

"The Egyptians exhibit great skill in their manner of cultivating the bee, as the flowers and the harvest are much earlier in Upper Egypt than in Lower, and the inhabitants profit by this circumstance in regard to their bees.

"They collect the hives of different villages on large barks, and every proprietor attaches a particular mark to his hives; when the boat is loaded, the conductors descend the river slowly, stopping at all the places where they can find pasturage for the bees. After having thus spent three months on the Nile, the hives are returned to the proprietor, and after deducting a small sum due to the boatmen for having conducted his hives from one end of Egypt to the other, he finds himself on a sudden enriched with a quantity of honey and wax, which is immediately sent to the market. This species of industry procures for the Egyptians an abundance of wax and honey, and

enables them to export a considerable quantity to foreign countries."

Niebuhr reports having once seen a flotilla of four thousand hives on the Nile between Cairo and Damietta, making their way from Upper Egypt to the Delta.

Throughout Africa honey-bees are common. "On the West coast of the river Gambia," we are told, "the natives formerly paid much attention to bees. They had hives made of reeds and sedges, shaped like baskets and hung on the outer boughs of trees." In some places they were hung so thickly that at a short distance they looked like large fruit on the branches.

Mr. Cummings in his "Adventures in South Africa" tells us that the wild bees there are the same as the domestic bees of England. But this is doubtless because the European bee has been extensively introduced.

Beeswax forms a considerable part of the cargoes of ships trading to the Gold and Ivory coasts and districts of Sierra Leone, and the western shores of Africa.

The European honey-bee was introduced by the Dutch settlers into southern Africa, where it quickly made itself at home, escaping to the woods and colonizing large areas, while in his "Origin of Species" Darwin says:—

"In Australia the imported hive-bee is rapidly exterminating the small, stingless native bee."

In New Zealand, the West Indies and the United States it has also become a permanent and flourishing resident.

In South America, in Cayenne and Surinam, there are reported little black bees with white wings. "They build their nest in the shape of a bagpipe, upon the tops of the highest trees. The honey is very sweet and agreeable, thin, and of a reddish color. From the latter the Indians extract a spirituous liquor of which they are passionately fond; of the wax they make candles."

From Spix's "Travels in Brazil" we get the following :

"Extraordinarily rich is the Sertão in numerous kinds of bees, which nest partly in the trees, partly in the earth. Their products in honey and wax are so important that many Sertanejos support themselves by the business of gathering the same."

A very interesting account of the bees of South America comes from Bates' "Naturalist on the River Amazons," this gifted naturalist and delightful writer having spent many years in South America collecting and observing the various forms of life there.

"The *Meliponæ* in tropical America," he tells us, "take the place of the true *Apides*, to which the European hive-bees belong, and which are here unknown ; they are generally much smaller insects than the hive-bees, and have no sting. The *M. Fasciculata* is about a third shorter than the *Apis Mellifica* ; its colonies are composed of an immense number of individuals. The workers are generally seen collecting pollen in the same way as other bees, but great numbers are employed gathering clay. The rapidity and precision of their movements whilst thus engaged are wonderful. They first scrape the clay with their mandibles ; the small portions gathered are then cleared by the anterior paws and passed to the second pair of feet, which in their turn convey them to the large foliated expansions of the hind shanks, which are adapted normally in bees, as every one knows, for the collection of pollen. The middle feet pat the pellets of mortar on the hind legs to keep them in a compact shape as the particles are successively added.

"The little hodsmen soon have as much as they can carry, and they then fly off. I was for some time puzzled to know what the bees did with the clay ; but I had afterwards plenty of opportunity for ascertaining. They construct their combs in any suitable crevice in trunks of trees or

perpendicular banks, and the clay is required to build up a wall so as to close the gap, with the exception of a small orifice for their own entrance and exit. Most kinds of *Meliponæ* are in this way masons as well as workers in wax and pollen gatherers. One little species, not more than two lines long, builds a neat tubular gallery of clay, kneaded with some viscid substance, outside the entrance to its hive, besides blocking up the crevice in the tree within which it is situated. The mouth of the tube is trumpet-shaped, and at the entrance a number of the pigmy bees are always stationed, apparently acting as sentinels.

“It is remarkable that none of the American bees have attained that high degree of architectural skill in the construction of their comb which is shown by the European hive-bee. The wax cells of the *Meliponæ* are generally oblong, showing only an approximation to the hexagonal shape in places where several of them are built in contact.

“A hive of the *Meliponæ Fasciculatæ*, which I saw opened, contained about two quarts of pleasantly-tasted liquid honey. The bees, as already remarked, have no sting, but they bite furiously when their colonies are disturbed. I found forty-five species of these bees in different parts of the country; the largest was half an inch in length; the smallest were extremely minute, some kinds being not more than one-twelfth of an inch in size. These tiny fellows are often very troublesome in the woods, on account of their familiarity; they settle on one's face and hands, and, in crawling about, get into the eyes and mouth, or up the nostrils.”

Another genus of stingless, honey-making bees — the *Trigona* — is found in tropical America as well as in the tropics of Asia and Africa. There are about a hundred species in these two genera, and their combs are very different from those of the hive-bee, containing as they do

waxen reservoirs, sometimes as large as a pigeon's egg, in which the honey is stored. These cells are placed close together and are often black or deep violet in color. The people of Mexico and some parts of South America call these stingless bees "angelitos," or "little angels." The bees are sometimes hived in hollow logs and suspended in the verandas.

Sometimes the hives are made of earthenware and are very ornamental, the hole through which the bees pass in and out being the mouth of a man or a monster whose head is moulded in the clay of which the hive is made. The bottles or cups containing honey are hung around the sides of the hive, but the cells in which the young are raised resemble the honey-comb of our hive-bees.

All of Europe is rich in honey-bees, and in most European countries bee-culture is practised.

In Russia the peasants extensively use honey instead of sugar, and the churches make a heavy demand for wax tapers. In former times Poland was particularly famous for its bee-culture, which is still practised to some extent. It is said that in the province of Yekarterinoslaw there are nearly four hives to every inhabitant.

In former times the island of Corsica paid Rome a large annual tribute of wax. The honey of Corsica was bitter, and thus not esteemed, and the wax is said to have been black, but of good quality, and readily whitened by bleaching.

East Friesland, a province of Holland, at the present day has two thousand hives per square mile, while France and Spain teem with bees, and produce much honey.

In Germany from olden time the neighborhood of Nuremberg has been particularly celebrated. The bee-masters there formed a guild of their own, had special privileges, and stood next to the Emperor, Nuremberg being called

the bee-hive of the holy Roman Empire ; and the Nuremberg honey-cakes are still celebrated.

From the middle ages to near the present time the German bee-masters led in the honey and wax producing industry, but lately they have had to give place to the New World, with its virgin bee-pastures and its great activity.

The United States now stands at the head, the most famous honey being that of California. It is to the modern world what the honey of Hybla and Hymettus was to the ancient ; and it is interesting to learn that a large part of it is made from the white sage, — a plant similar to the Attic and Sicilian thyme, and which gives to the honey a similar flavor.

Honey is still gathered by the bees of Attica and of Sicily, and the honey of Hymettus is eaten in Athens to-day, there being as many as one hive to each person in the province of Attica. The flowers and the bees are about Hymettus as of old, and the honey retains its ancient fame, though it scarcely deserves to, according to the testimony of Mahaffy, who, in his "Rambles and Studies in Greece," says, taking a view from the Acropolis, and noticing the sterility of the soil : —

"Then Thucydides' words come back to us, when he says Attica was 'undisturbed on account of the lightness of its soil,' as early invaders rather looked out for richer pastures. This reflection, too, of Thucydides applies equally to the mountains of Attica, round Athens, which are not covered with rich grass and dense shrubs, like Helicon, like Parnassus, like the hills of Arcadia, but seem so bare that we wonder where the bees of Hymettus can find food for their famous honey. It is only when the traveller ascends the rocky slopes of the mountain that he finds its rugged surface carpeted with quantities of little wild flowers, too insignificant to give the slightest color to the mountain, but

sufficient for the bees, which are still making their honey as of old. This honey of Hymettus, which was our daily food at Athens, is now not very remarkable either for color or flavor. It is very dark, and not by any means so good as the honey produced in other parts of Greece, — not to say on the heather hills of Scotland and Ireland. I tasted honey at Thebes and at Corinth, which was much better, especially that of Corinth, made in the hills towards Cleonæ, where the whole country is scented with thyme, and where thousands of bees are buzzing eagerly through the summer air."

The poet's favored palate, however, is still able to detect the flavor of antiquity in the Attic honey, and we are grateful to Byron for singing thus of famed Hymettus, in "Childe Harold": —

"Still his honeyed wealth Hymettus yields;
There the blithe bee his fragrant fortress builds;
The free-born wanderer of the mountain air."

The Abbé Barthélemy, too, does not share Mahaffy's dark view of the subject, for he tells us, speaking of bees:

"These insects are extremely partial to Mount Hymettus, which they have filled with their colonies, and which is covered almost everywhere with wild thyme and other odoriferous plants; but it is chiefly from the excellent thyme which the Mount produces that they extract those precious sweets, with which they compose a honey in high estimation throughout Greece."

The New World, covered with bloom, its wild flowers untouched by the plough, and free from the depredations of the insects that are a concomitant of civilization, afforded an ideal home for the bees, and it is a pleasure to turn from time-devastated Hymettus to the fresh bee-pastures of our own California, and listen to the delightful bee-talk of John

Muir, whose book, "The Mountains of California," none can afford to miss reading.

He says : —

"When California was wild, it was one sweet bee-garden throughout its entire length, north and south, and all the way across from the snowy Sierra to the ocean.

"Wherever a bee might fly within the bounds of this virgin wilderness, — through the redwood forests, along the banks of the rivers, along the bluffs and headlands fronting the sea, over valley and plain, park and grove, and deep, leafy glen, or far up the piny slopes of the mountains, throughout every belt and section of climate up to the timber line, — bee flowers bloomed in lavish abundance. Here they grew more or less apart in special sheets and patches of no great size, there in broad, flowering folds hundreds of miles in length, — zones of polleny forests, zones of flowery chaparral, stream-tangles of rubus and wild rose, sheets of golden compositæ, beds of violets, beds of mint, beds of bryanthus and clover, and so on, certain species blooming somewhere all the year round."

Again, he is speaking of the bottom-lands along the rivers : —

"When I first saw this central garden, the most extensive and regular of all the bee-pastures of the State, it seemed all one sheet of plant gold, hazy and vanishing in the distance, distinct as a new map along the foot-hills at my feet.

"The air was sweet with fragrance, the larks sang their blessed songs, rising on the wing as I advanced, then sinking out of sight in the polleny sod, while myriads of wild bees stirred the lower air with their monotonous hum, — monotonous, yet forever fresh and sweet as every-day sunshine."

The hive-bee, not indigenous in this country, was brought

by settlers from Europe to America sometime in the seventeenth century, it is supposed, though the exact date is not known. It is stated by some that the first were taken, certainly with great propriety, by the Spaniards to Florida, the land of flowers.

They are there to-day, some in large and scientifically conducted apiaries, some in old-fashioned box hives in remote hammocks, adding to the meagre stores of their native owners, who live in a cabin near them.

In the "Bee Journal" for July, 1886, we read : —

"When John Eliot translated the Scriptures into the language of the aborigines of North America, no words were found expressive of the terms 'wax' and 'honey.'"

The first form of *Apis Mellifica* brought to this country was the common "brown" or German bee, and it is this variety which is still commonly kept in remote country places, and this which at first filled the land with innumerable swarms of "wild bees."

Until recently it was the only hive-bee we had, and it is of this bee and the white clover, which also came to North America with the European settler, that Hiawatha sings, describing the coming of the conqueror : —

"Wheresoe'er they move, before them
Swarms the stinging fly, the Ahmo,
Swarms the bee, the honey-maker;
Wheresoe'er they tread, beneath them
Springs a flower unknown among us,
Springs the White Man's Foot in blossom."

The Indians are said to have foretold the approach of the white man by the swarms of bees that shortly preceded him, — a form of divination whose prophecies have always come true, and had the Red Man recognized in them an emblem of misfortune to his race, as some of the ancients did, that prophecy would also have come true.

Thomas Jefferson thus informs us : —

“The bees have generally extended themselves into the country, a little in advance of the white settlers. The Indians therefore call them the white man’s fly.”

And Washington Irving adds : —

“It is surprising in what countless swarms the bees have overspread the far West within but a moderate number of years. The Indians consider them the harbingers’ of the white man, as the buffalo is of the red man, and say that in proportion as the bee advances, the Indian and the buffalo retire. We are always accustomed to associate the hum of the bee-hive with the farmhouse and the flower-garden, and to consider those industrious little animals as connected with the busy haunts of man ; and I am told that the wild bee is seldom to be met with at any great distance from the frontier.

“They have been the heralds of civilization, steadily preceding it as it advances from the Atlantic borders ; and some of the ancient settlers of the West pretend to give the very year when the honey-bee first crossed the Mississippi.

“At present it swarms in myriads in the noble groves and forests that skirt and intersect the prairies, and extend along the alluvial bottoms of the rivers. It seems to me as if these beautiful regions answer literally to the description of the land of promise, — ‘a land flowing with milk and honey ;’ for the rich pasturage of the prairies is calculated to sustain herds of cattle as countless as the sands upon the seashore, while flowers with which they are enamelled render them a very paradise for the nectar-seeking bee.”

While the date of the first arrival of the honey-bee in the United States is doubtful, the date of its introduction into California is better known.

It did not find its way by slow degrees as the line of

white settlements gradually extended across the continent, but was introduced there with great painstaking.

There are many species of wild bees that eat honey but do not store it up, and it is to these that Muir refers in the following statement concerning the coming of the hive-bees to California : —

“ How long the various species of wild bees have lived in this honey-garden, nobody knows; probably since the main body of the present flora gained possession of the land, toward the close of the glacial period. The first brown honey-bees brought to California are said to have arrived in San Francisco in March, 1853. A bee-keeper by the name of Shelton purchased a lot, consisting of twelve swarms, from some one at Aspinwall, who had brought them from New York. When landed at San Francisco, all the hives contained live bees, but they finally dwindled to one hive, which was taken to San José. The little immigrants flourished and multiplied in the bountiful pastures of the Santa Clara Valley, sending off three swarms the first season.

“ The owner was killed shortly afterward, and in settling up his estate, two of the swarms were sold at auction for \$105 and \$110 respectively. Other importations were made from time to time, by way of the isthmus, and, though great pains were taken to insure success, about one-half usually died on the way. Four swarms were brought safely across the plains in 1859, the hives being placed in the rear end of a wagon, which was stopped in the afternoon to allow the bees to fly and feed in the floweriest places that were within reach until dark, when the hives were closed.”

Thus modestly began what has since grown to be one of the most important bee industries in the world.

Thousands of acres of bee-pasture have been despoiled of their flowers by agriculturists and shepherds, the latter

sweeping over the country with what Muir calls their "hoofed locusts" and laying waste the beautiful valleys as if a fire had devastated them. And yet there is abundant pasture for almost innumerable swarms of bees.

The bees of California, like those of India, and in fact of all warm climates, sometimes hang their combs in the open air, and Muir says : —

"Out in the broad, swampy delta of the Sacramento and San Joaquin rivers, the little wanderers have been known to build their combs in a bunch of rushes, or stiff, wiry grass, only slightly protected from the weather, and in danger every spring of being carried away by floods. They have the advantage, however, of a vast extent of fresh pasture, accessible only to themselves."

Sometimes the bees of California hang their combs in the branches of the trees, and in Ireland the bees sometimes build in trees or bushes, the combs weighing the twigs of the bushes to the ground ; and the present writer has seen combs built in the open air under the eaves of a barn in Rhode Island, where the weather is certainly too severe to allow of wintering out of doors. These combs, however, appeared to be an overflow, so to speak, from the well-filled space between the roof and sides of the barn, where a large quantity of honey must have been stored away.

Bees sometimes select strange quarters for their hives, it being recorded that in a French fort on the African coast in 1702, an empty powder cask was taken possession of and filled with honey by a swarm of bees, while Muir says that a friend of his, while out hunting on the San Joaquin, sat down to rest upon an old coon trap he found, but which proved to be occupied by a swarm of bees and to contain more than two hundred pounds of honey.

For several years a swarm of bees lived in the steeple of a church in a New Hampshire village. Finally, a large

quantity of honey was removed, and since it belonged to the church, it was given to the poor and the sick of the village, and a honey festival was held to which all were invited to come and eat.

In a contemporary newspaper we learn that the "old Hawes house," at Yarmouth, Mass., which had sheltered many generations of Cape Cod people, was finally to go the way of houses and be torn down. The workmen found, however, that the old walls were not tenantless, but evidently had sheltered many generations of Cape Cod bees, which bitterly resented the destructive intentions of the invaders, pouring forth in such immense numbers and betraying such a passion for fighting as compelled the workmen to retreat. It is said one whole side of the building between the walls was solidly packed with honey, and the work of demolition came to a standstill until cold weather should conquer the valiant defenders of the Hawes' lares and penates, when it was believed hundreds of pounds of honey would be taken out.

This story is doubly discounted by one found in the Swiss Alpine folk tales. There were in the golden age brooks and seas filled with milk, and once a shepherd capsized in his boat and was drowned in one of them ; his long-sought body, when finally discovered and moved, brought to light the foaming cream as though it were being churned, and he was buried in a cavern which the bees had built full of honey-combs *as large as city gates*.

These are the largest honey-combs yet recorded, as far as the present writer knows, though Pliny describes some seen in Germany that had attained the creditable length of eight feet, and which on the convex side were black.

Hollow trees are the favorite hiving places of *Apis Mellifica* ; and notwithstanding the long domestication of the bees, they still retain their wild instincts to such an extent

that they usually prefer to take to the woods instead of proceeding to the comfortable hives provided for them, unless man interferes and compels them to stay where he wants them. Occasionally a swarm is very obstinate, however, and as often as it is hived will swarm out until it succeeds in making good its escape.

"Bells' ding-dong
And choral song
Deter the bee
From industry;
But hoot of owl
And 'wolf's long howl'
Incite to moil
And steady toil,"

runs an old German rhyme, which is not devoid of truth.

The inhabitants of the southern United States originally made their hives of sections of hollow trees, the sweet gum being the tree preferred, and for this reason the hives were called "bee gums," — a name that still lingers, although the hollow tree is less frequently used than formerly.

In the mountains of the Carolinas, however, veritable "gums" may still be seen, and even manufactured hives are called "gums." It is only fair to add that one may find the latest styles of hives, with "all the modern improvements," including an Italian queen, in unexpected corners of these mountains, where there is abundant bee-pasture eight or nine months in the year, and where of course there are innumerable "bee-trees" in the forests, the bees still preferring a hollow tree of their own choosing to the "gums" of the mountaineers.

Muir tells us that the honey-bee is now found wild throughout the Sierra, swarms having escaped from their owners in the lowlands and taken possession of hollow trees even higher than eight thousand feet above sea-level.

One cannot wonder that the honey-bees have occupied the Sierra after reading Muir's beautiful tribute to Mount Shasta : —

“Of all the upper flower fields of the Sierra, Shasta is the most honeyful, and may yet surpass in fame the celebrated honey hills of Hybla and heathy Hymettus. Regarding this noble mountain from a bee point of view, encircled by its many climates, and sweeping aloft from the torrid plain into the frosty azure, we find the first five thousand feet from the summit generally snow-clad, and therefore about as honeyless as the sea. The base of this arctic region is girdled by a belt of crumbling lava measuring about one thousand feet in vertical breadth, and is mostly free from snow in summer. Beautiful lichens enliven the faces of the cliffs with their bright colors, and in some of the warmer nooks there are a few tufts of Alpine daisies, wall-flowers, and pentstemons ; but, notwithstanding these bloom freely in the late summer, the zone as a whole is almost as honeyless as the icy summit, and its lower edge may be taken as the honey line. Immediately below this comes the forest zone, covered with a rich growth of conifers, chiefly Silver Firs, rich in pollen and honey-dew, and diversified with countless garden openings, many of them less than a hundred yards across. Next, in orderly succession, comes the great bee zone. Its area far surpasses that of the icy summit and both the other zones combined, for it goes sweeping majestically around the entire mountain, with a breadth of six or seven miles and a circumference of nearly a hundred miles.”

Bravo ! bravo ! noble Shasta, Hybla and Hymettus were mere hillocks compared to thee. But they will live on, saved from oblivion by the glory of ancient Greece, a more lasting promise of immortality than thy broad flowery zones.

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It is in southern California, however, that bee-culture has received most attention.

From one hive taken to Los Angeles County in 1854 the industry grew to between fifteen thousand and twenty thousand hives in 1876.

All over the United States bee-culture has received a wonderful impetus which within fifty years has given it a place in the sum of the nation's wealth.

The following statement is made by A. J. Cook, Professor of Entomology in the Michigan State Agricultural College, and author of a book on bees:—

“An excellent authority places the number of colonies of bees in the United States, in 1881, at 3,000,000, and the honey production for that year at more than 200,000,000 pounds. The production for that year was not up to the average, and yet the cash value of the year's honey crops exceeded \$30,000,000.”

Mr. Frank Benton, in charge of the apiarian work of the U. S. Department of Agriculture, in 1895, puts the estimate at \$20,000,000 for the annual value of apiarian products.

From the Year Book of the U. S. Department of Agriculture we learn that in 1894 there was exported from the United States honey to the value of \$127,282, considerably more than half of which went to Great Britain and Ireland. There was also exported in that year \$118,093 worth of wax.

It is said that in 1890 bee-keeping gave employment in the United States to three hundred thousand persons, and there are a number of large factories where nothing is manufactured but bee-keepers' supplies.

The amount of honey marketed each year varies according to the weather as much as the grain or fruit crop,—even more. One year of favorable conditions will bring a tremendous honey flow, when bees thrive apace and

store phenomenal quantities of sweets. Another year or succession of years the wild-flower crop will not prosper, and then, indeed, the bees undergo great hardships, and pine and die in large numbers. The wild plants suffer even more from adverse weather than do the cultivated ones, and a season of drought will often extinguish hundreds of acres of bloom. Muir tells us : —

“ Bees suffer sadly from famine during the dry years which occasionally occur in the southern and middle portions of the State.” He says further, describing the severe drought of 1877 : —

“ But the fate of the bees that year seemed the saddest of all. In different parts of Los Angeles and San Diego counties, from one-half to three-fourths of them died of sheer starvation. Not less than eighteen thousand colonies perished in these two counties alone, while in adjacent counties the death rate was hardly less.

“ Even the colonies nearest to the mountains suffered this year, for the smaller vegetation on the foot hills was affected by the drought almost as severely as that of the valleys and plains, and even the hardy, deep-rooted chaparral, the surest dependence of the bees, bloomed sparingly, while much of it was beyond reach. Every swarm could have been saved, however, by promptly supplying them with food when their own stores began to fail, and before they became enfeebled and discouraged ; or by cutting roads back into the mountains and taking them into the heart of the flowery chaparral.”

This method of transporting bees to flowery regions was practised in early times, and is still carried on in many countries.

Pliny says : —

“ There is a village, called Hostilia, on the banks of the river Padus : the inhabitants of it, when food fails the bees

in their vicinity, place the hives in boats and convey them some five miles up the river in the night. In the morning the bees go forth to feed and then return to the boats, their locality being changed from day to day, until at last, as the boats sink deeper and deeper in the water, it is ascertained that the hives are full, upon which they are taken home and the honey is withdrawn."

This method of supplying the bees with nectar is still employed on the river Po, the present name of the ancient Padus. The people mark a water line about the boat at starting and to it attach a scale by which they can tell how deep the boat sinks, and so judge when the hives are full and the time has come for returning home.

Columella tells us that the Greeks, too, took their bees in search of honey, wandering from Achaia as far as Attica for the purpose.

Bees were also conveyed from Eubœa and the Cyclad Islands to Syrus, and to Hybla from other parts of Sicily.

Huish says:—

"It is the custom of the modern Greeks who inhabit the coast of Asia Minor, towards the islands of the Archipelago, to transport their hives by sea in order to procure an abundance of food for their bees."

Urquhart, in his "Spirit of the Orient," tells us that upon the shores of Thessaly the bees are carried about by boats, to gather honey wherever flowers are abundant.

From Kohl's "Southern Russia" we learn that the Armenians on the steppes of the Black Sea wander about like nomads with their bee-hives, pitching their tents in flowery places and placing the hives in a long line until the honey of that region has all been gathered, and that sometimes there will be as many as a thousand hives together.

In Spain the bees are carried from place to place on the backs of mules, while in Palestine, where modern bee-keep-

ing has been introduced — strange to say — from America, the transportation is yet more unique. Five brothers there owned 350 stocks of bees that yielded them 26,000 pounds of honey during the season of 1885. "Some 12,000 pounds of this were furnished in April by the orange groves at Jaffa, and the wild thyme on the hills about Bethlehem gave the remainder, during July. The transportation of the stocks is effected at night on the backs of camels, sixteen in a load. Attendants and camels rest during the day while the bees fly, and when night approaches 'they fold their tents like the Arabs and silently steal away.' What a sight to see more than twenty of these ships of the desert, with their living burdens, filing over the Judean hills! Natives and foreigners in the Holy Land have made big eyes over the new business which has come from over the ocean — even from young America."

One should think they might! In Germany bees are taken to the blooming rape fields, and the people of La Beauce, France, take their hives every August in carts to a distance of about ten miles, where they find heath or buckwheat in flower, the sainfoin and vetches of their own district yielding no further supplies. The people call this transporting of the bees "leading them to pasture."

They travel by night at a slow pace over the easiest roads they can find, each cart containing thirty or forty hives.

They remain about two months in a place of pasturage in little villages containing sometimes as many as three thousand hives.

Sometimes the hives are moved several times in a season, going from one place to another, where certain flowers bloom abundantly at different seasons.

In Scotland the bees are carried in carts to the Highlands, to gather honey from the heather when the nectar of the Lowlands has been exhausted.

According to Burroughs, "Bees will go three or four miles in quest of honey, but it is a great advantage to move the hive near the good pasturage, as has been the custom from the earliest times in the Old World. Some enterprising person, taking a hint perhaps from the ancient Egyptians, who had floating apiaries on the Nile, has tried the experiment of floating several hundred colonies north on the Mississippi, starting from New Orleans and following the opening season up, thus realizing a sort of perpetual May or June, the chief attraction being the blossoms of the river willow, which yield honey of rare excellence. Some of the bees were no doubt left behind, but the amount of virgin honey secured must have been very great. In September they should have begun the return trip, following the retreating summer south."

To-day the bee-keepers of California follow the flowers up the mountain sides or over the plains, a bee-keeper sometimes transporting his hives a hundred miles in a season. When sage is in bloom the provident bee-keeper takes his charges to the chaparral, and when the great bean fields are blooming along the coast the bee-man appears with his hives, that the bees may store him a few tons of honey, which will vie in value with the returns the owners of the gardens get from the crops they raise, and for which they in part have to thank the bees, because of their valuable work in fertilization.

The year 1860 was a memorable one for the hive-bees of the United States, for there came the first consignment of their formidable rival, the Italian honey-bee. So prolific and so industrious is this beautiful golden creature that it has gone far towards supplanting the brown bee in this country.

It is not a case of extermination, however, as is that of the American Red Man, but of amalgamation. The new-

comer has joined forces with the brown bee, and gradually, without bloodshed or cruelty of any sort, taken its place. So common has the Italian strain become that in many parts of the country the wild swarms in the bee-trees show the yellow body-bands of the Italians.

Other bees, since the coming of the Italians, have been brought to this country, as the Cyprian, Syrian, Carniolan, Palestine, or Holy-land, and Egyptian bees, each kind being distinguished by some peculiar excellence.

Moreover, new varieties of bees have been developed by cultivation, and there now exist, by design or accident, swarms of hive-bees with so long tongues that they can obtain at least a portion of the red-clover nectar.

No doubt the bumble-bees, which are our only native honey-makers, and whose structure is very similar to that of the hive-bees, although their habits are widely different, will shortly have to face the problem of how they are to protect their long-time rights in red-clover heads from the arrogant new usurpers.

Although bumble-bees often store up a honey that is relished by boys and bears, they have never been cultivated nor very highly esteemed by man.

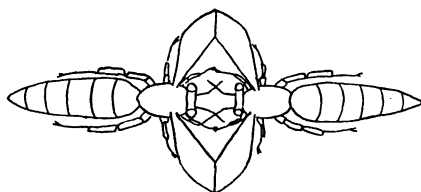
They build their nests underground or in inaccessible piles of rubbish, and some at least form no waxen cells, the honey when stored being placed in the cocoons deserted by the brood after it is matured. Naturally such honey is not very abundant nor very valuable ; and even where wax cells are built, the yield is far inferior in every way to the store of the hive-bee.

Still, we could not spare the drowsy hum of the furry bumble-bees in our summer fields ; and let us not forget in our enthusiasm over the hive-bees, that the "burly, dozing Humble-bee" is the native honey-gatherer of North America, — that is, north of Mexico.

His cheery hum was heard over the vast flowery plains of this favored land before the western continent was dreamed of by the white man, and in his underground nest was stored the only honey made in honey-flowing California for millenniums.

"I will follow thee alone,
Thou animated torrid zone !
Zigzag steerer, desert cheerer,
Let me chase thy waving lines ;
Keep me nearer, me thy hearer,
Singing over shrubs and vines."

The Humble Bee : EMERSON.



Appendix

Note

THE fine translation of Kálidása's Sakuntala is by Monier Williams, 1856.

Kálidása's Birth of the War God is translated by Ralph T. H. Griffith, Principal of Benares College.

Kálidása's Hero and Nymph is from Wilson's Theatre of the Hindus.

The Toy Cart is also from the Theatre of the Hindus.

Nágánanda, A Buddhist Drama, is from the Theatre of the Hindus.

The quotations from the Vedas, the Sutras, Puranas, etc., are from the Sacred Books of the East, edited by Max Müller.

Chapter I. — See "The Chinese Sugar" — Jas. F. C. Hyde. Essay on Sugar — Niccol. Manual of Entomology — Dr. Hermann Burmeister. Text-Book of Entomology — Packard. Manual for the Study of Insects — Comstock.

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The Feminin Monarchi — <i>Chas. Butler</i> . 1634	40
Charles Butler. The Feminin Monarchi, or Histori of Bees, 1634. The first edition appeared in 1609. The book was printed from a peculiar form of type devised to illustrate a method of phonetic spelling	40
Ants, Bees, and Wasps — <i>Sir John Lubbock</i>	42
"And he shall sing" — Theocritus — <i>Lang's trans.</i>	43
<i>Huber: Observations on Nat. Hist. of Bees</i>	44
Antennæ as sense organs — see <i>Cheshire: Bees and Bee-keeping</i>	46

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"Should some alien being" — <i>Ibid.</i>	46
"Every apiarist" — <i>A. J. Cook: The Bee Keeper's Guide</i>	47
The Theatre of Insects — <i>Thomas Moffett. 1658</i>	47
<p>Most of the material in Moffett's book is taken from the writings of Conrad Gesner, a poor Swiss who at great pains collected all that was known of the history of animals and published five large volumes; but before he completed his work upon insects, death claimed him, in 1558, and his work after passing into several hands was finally incorporated in Moffett's work nearly a century after Gesner had prepared it.</p>	
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"Insects can smell" — <i>Arist.: Hist. An., iv. 8</i>	51
<i>Pliny: Nat. Hist. chap. on Bees</i>	51
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Glands in head — <i>Cheshire: Bees and Bee-keeping, p. 80</i>	55
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The number of vibrations made by a bee's wing in a minute have been reckoned by registering the wing's beats on a rapidly turning wheel covered with lamp-black, but this is not accurate, as the wing moved less quickly because of the obstruction	62
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<i>Butler : Fem. Mon.</i>	73
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"A voice is heard"— <i>Virg.: Geor.</i> , iv.	126
<i>Texan Bee Journal. The Southland Queen.</i> March, 1898	128
<i>Arist.: Hist. An.</i> , ix. II	129
<i>Pliny</i> , ix. vii. II	130
<p>The mating of the queen and drone of the hive-bee takes place high in the air and has seldom been seen by man. Consequently the ancients and even the moderns, up to recent times, were greatly puzzled on the subject of the generation of bees. Even Swammerdam believed the bees were fecundated by <i>emanations</i> from the drone. Huber explained the true method of mating, which has been repeatedly verified since, and which is very curious; since it is necessary for the queen to become impregnated quickly and at the same time to receive a large amount of fertilizing material for future use, she returns to the hive bearing with her the organs of the male. It is this loss and the consequent mutilation that causes the death of the drone in a few hours. It seems to be analogous to the loss of the sting, which so frequently occurs among workers, and always with fatal results.</p> <p>The queen will continue to fly abroad every day for several days if she does not succeed in mating; but if she does not mate before a certain length of time, or if she fails to mate at all, she will never lay any but unfertilized or drone eggs</p>	
<i>Huber: Obs. on Nat. Hist. Bees</i>	133
"In the vast creation"— <i>Latreille: Hist. of Insects</i> under article <i>Bees</i> . Quoted by <i>Huish</i>	134
<i>Packard's Guide to the Study of Insects</i>	137
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Rosemary honey in Narbonne — <i>Bevan</i>	182
Balm of Pontus — <i>Menzel: Myth. Forsch.</i>	182
Sealed cans or bottles of honey bearing the mark of the	
apiary whence the honey came can be relied upon.	
Pure honey after standing awhile has a tendency to	
granulate, and this, which is a sign of its purity, is by	
some mistakenly supposed to be a sign of adulteration,	
and glucose honey, which does not granulate, is there-	
fore preferred by those ignorant of this characteristic	
of honey	186
The adulteration of honey is an offence punishable by	
law. <i>Glucose</i> , according to <i>Gleanings in Bee Culture</i> ,	
Mch. 15, 1897, can be very easily detected as follows: 187	
"Add three spoonfuls of alcohol to one of the honey to be	
tested, stir vigorously for awhile, and then let the mixture	
stand for about fifteen minutes. If it then has a bluish milky	
cast, as if a very little milk had been mixed with a small quan-	
tity of water, glucose is present."	
<i>Xenophon's Anabasis</i> , bk. iv. ch. viii.	188
<i>Strabo: Geog. of Greece</i> , xii. 3	189
Poisonous honey near Philadelphia — see <i>Bevan: The</i>	
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"A party of young men" — <i>Ibid.</i>	191
List of poisonous plants in this country given by Dr. Barton — <i>Ibid.</i>	191
The honey gathered from rhododendrons and laurels contains a narcotic poison which is to be treated medi- cally as such	192
<p>It is probably because of the sticky surface of these flowers that hive-bees are not fond of them. The bumble-bee can free itself, but smaller bees are sometimes entangled and so meet their death.</p>	
"It has been a gross libel" — quoted by <i>Bevan</i>	194
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"My limbs are racked" — <i>Ibid.</i>	209
"Through Hrothgar's mind" — <i>Beowulf: English Writers</i> , i.	210
"Then she went round" — <i>Ibid.</i>	210
"The Queen said" — <i>Ibid.</i>	210
"The bright warriors" — <i>Ibid.</i>	211
"Never have I heard" — <i>English Writers</i> , vol. i.	211
"Then asked Gárigleri" — <i>Sn. Edda, Gylfag.</i> , ch. 20, from <i>Tegner's Frithiof's Saga</i>	211
"My mead-cup's flavor" — <i>King Bele and Thorsten Vikingsson</i>	212
"Went there at times" — <i>Tegner's Frithiof's Saga</i> , Canto iii.	213
"What wilt thou?" — <i>Ibid.</i> , Canto iv.	213
"The bright-faced Gudrun" — <i>Corpus Poeticum Boreale</i> .	

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<i>Gudbrand Vigfusson, M. A., and F. York Powell, M. A., vol. i. Atla Krida</i>	213
"I dreamed that two hawks" — <i>Corpus Poeticum Boreale</i>	214
"Adam drowned his ghost" — <i>Legends of the Holy Rood, ed. Richard Morris, S. S. D. Dispute bet. Mary and the Cross, xvi.</i>	214
"The fell Jews" — <i>Ibid., xviii.</i>	214
<i>Merry Wives of Windsor, v. 5. 167</i>	215
<i>Love's Labour's Lost, v. 2. 233</i>	215
"There is a wine" — <i>Pliny: Nat. Hist., bk. xv. ch. xx.</i>	219
The Hydromel of Æginata — <i>Thos. Moffett: The. of Insects</i>	220
Galen's honeyed vinegar — <i>Moffett</i>	221
"Aświns, men who" — <i>Rig-Veda, 139.3</i>	226
"When Aświns, you harness" — <i>Rig-Veda, 157.2</i>	226
"May the three-wheeled cart" — <i>Rig-Veda, 157.3</i>	226
"Bring us Aświns" — <i>Rig-Veda, 157.4</i>	226
"With those aids" — <i>Rig-Veda, 112.21</i>	226

Honey was believed to come from the moon, hence the reference to the Aświns delivering honey to the bees.

"When Maruts" — <i>Rig-Veda, 87.2</i>	227
"He then seeks her mouth" — <i>Grihya-Sūtra of Hiranyakesin, i. 7.24</i>	227
"Let the father" } <i>Sāṅkhāyana-Grihya-Sūtra, i. 24.34</i>	227
"I administer" }	
"When a son" — <i>Āśvalāyana-Grihya-Sūtra, i. 15.1</i>	228
"Such food" — <i>Ibid., xvi. 5</i>	228
"He pours cold water" — <i>Sāṅkhāyana-Grihya-Sūtra, i. 28.8</i>	228
"This branch" — <i>Ibid., iii. 2.5.6</i>	229

A son was the dearest wish of the Hindu, as otherwise the proper sacrifices could not be performed at the father's death, and as honey is mythically connected with birth and the production of offspring, hence the invocation at the founding of a home. Cattle were the chief wealth of the ancient Hindus,

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and the significance of the ever-fertile cow is sufficiently evident.	
"If the bees" — <i>Ibid.</i> , v. 10.1.2.3	229
{ "What is the honied" } <i>Grihya-Sûtra</i> of Hiranyakesin,	
{ "I eat thee" } i. 4.13	230
"Having cooked" — <i>Pâraskara-Grihya-Sûtra</i> , ii. 16.2	230
The vow, at the cutting of the beard, to avoid honey — <i>Khôdira-Grihya-Sûtra</i> , ii. 5.11	230
It probably was true then, as at the present day, that honey was believed to be stimulating and heating in its effects, and therefore was not considered desirable food for students or for youths.	
The bee at the heart of the lotus. The Indian Songs of Nagha, referred to by Menzel: <i>Mythologische Forschungen Monographie der Biene</i>	231
The bee the symbol of love	231
Where we find the bee in mythology we usually find it symbolical of the creative power, representing love, birth, and even the new birth, the resurrection into the higher life, as will appear more fully later.	
The companions of Kama — see Wilkins' <i>Hindu Mythology</i>	232
"The Purāṇas distribute" — Colebrooke: <i>Essays: Religious Ceremonies of Hindus and Brahmans</i>	232
"The waters became solid" — <i>Vishnû-Purana</i> , i. 13	233
"The flesh of" — <i>Vishnû-Purana</i> , iii. 16	233
"In former times" — <i>Ibid.</i>	233
The student prohibited the use of honey — <i>Vishnû-Sûtra</i> , 28.2	233
Probably for the reason already given.	
Taxes — <i>Ibid.</i> , 3.25	234
"One who has stolen honey" — <i>Ibid.</i> , 44.17	234
When passing honey — <i>Ibid.</i> , 63.30	234
"Unless it consist" — <i>Ibid.</i> , 63.45	234
Exemption from disease — <i>Ibid.</i> , 92.16	234
To obtain beauty — <i>Ibid.</i> , 90.26	234

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"Her eyes were similar" — <i>Vishnú-Sûtra</i> , i. 22 . . .	234
Kama's death	238

The harsh decree was afterwards modified, and the god of love restored to life upon the wedding of Uma and Siva, and at the present day is as efficient in the use of his flower-tipped arrows as he was of yore.

"When bees festoon"	239
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Lines and clusters of dark bees laid upon the light surface of the lotus-flowers is a frequent image in Hindu poetry.

In the extravagant language of a later age when nothing was spared that could add force or color to a phrase, we find the sacred and mysterious word Om thus used, — the divine Sarasvate, goddess of learning, still a maiden of tender years, serving Brahma, is described.

In the flowers of her ear-ornaments tribes of devoted bees attended upon her like repeated oms accompanying the "Çruti." *Harsa-Carita*, a historical romance by Bāna — Trans. by E. B. Cowell and F. W. Thomas. 239

"What sounds are these?" — <i>Kālidasa: The Hero and the Nymph</i>	239
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"The dried up dew"	242
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In the rutting season a thick honey-like dew, attractive to bees, exudes from the elephant's temples.

This secretion does not appear to have been offensive to the people, far otherwise, and there are frequent references to it. The following quotations from Bāna's *Harsa-Carita* graphically, and possibly with exaggeration, describe this phenomenon. The elephant stable is observed, — "indistinct, owing to the distance, but regaling the nostrils with an odor as of groves of *Vakula* trees in full bloom which diffused itself far and wide, while the stable was filled with streams of ichor covered with bees."

"Sweet inebriating fragrance"	243
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The inebriating effect of the nectar of flowers upon the bees is a favorite fancy with the Hindu poets, as is also the song of the bee, but of all the wild flights of fancy indulged in on the subject, nothing is known to the present writer to com-

pare with this, culled from the Harsa-Carita. The description is of a portion of the bank of a beautiful river, —

“Here are honeyed voices of peacocks, trees having stocks besanded with heaps of pollen, the entrancing hum of lute-like clusters of scent-intoxicated bees.”

“A fragrance of flowers” 243

The bridegroom also was not without his charms, which, however, will not be so fully appreciated by modern readers, for we are informed that, “A throng of bees crowding towards his fragrance arrayed his willowy form as with a dark garment.” In another part of the romance we have this oriental description of the future bride : “her blooming moon-like face flooding the world with an outpouring of beauty like a stream of passion, buoyed up by swarms of dusky bees attracted by the fragrance of her flowery couch.”

It is worth while to know that the youth of whom she was enamoured and whom she finally married presented many very remarkable characteristics and among them, “His mouth, breathing a fragrance of mangoes, camphor, *kakkala*-fruits, cloves, and coral trees, and resounding with a hubbub of intoxicated bee-swarms, seemed to emit a very spring together with a pandana forest.”

The king of this period had a voice “flowing like a river of honey.”

One cannot help wondering if this attraction of the bees to a fragrant breath or body was not sometimes fraught with unpleasant consequences, for the sting of a tropical bee is severe, and in fact such a mishap was dreaded, as we learn from the king's jester in the *Nágánanda*, a Buddhist drama : —

“Holloa! why now do these odious bees attack me?” (smelling himself.) “Ah! I see how it is. I have been respectfully decked with perfumes by the relations of Malay-avati, as the bridegroom's friend, and a garland of *Saritâria* flowers has been placed upon my head, and now that very respect has become a cause of an annoyance.”

As a rule, however, those who fell victims to the bees were pious hermits practising their devotions and standing motionless with helpless, outspread arms. One very sad case is related of a hermit whose sacred though powerful odors dis-

turbed a beautiful lady walking with her husband the king. She prevailed upon her lord to assist her in cleansing the devotee and rubbing him down with aromatic oils.

It is related that he patiently submitted, not only to the cleansing process, but also to the swarms of bees that straightway fell upon him and that the too sensitive lady received a terrible and fitting punishment from the gods for objecting to the odor of sanctity.

In the *Nágánanda* we find the following polite form of asking for a kiss:—

"O lovely one! if this face of thine, with its pink flush as it is lighted up by the sun's rays, and with its soft down revealed by the spreading gleam of its teeth, is really a lotus, why is not a bee seen drinking the honey from it?"

The two fables—see *Glock: Symbolik der Bienen* . . . 245

The Bee's Dream—*The Warner Library of the World's Best Literature. Indian Lit.* . . . 246

Honey at the wedding—see *Menzel's Myth. Forsch.*, where it is related that bees clustering upon the pudendum is used symbolically in India to signify fruitfulness, honey in marriage celebrations having a similar significance . . . 246

We are also told that not only the brow and the mouth, but also the eyelids, ears, and pudendum of the bride are touched with honey accompanied by benedictions. See *Menzel's Myth. Forsch.*, *Glock's Symbolik der Bienen*, and *Religious Ceremonies of Hindus and Brahmans, Colebrooke Essays*.

In the following description of a bridal chamber, taken from *Bāna's Harsa-Carita*, the presence of the bees is no doubt significant:

"About its portals were figured the spirits of Love and Joy. Bees, going before like friends, raised a hubbub. The charmed lamps, which lighted it, swayed in the wind of the bees' wing."

Egyptian Hieroglyphics—Saml. Sharpe, 1861. *Dict. of Hieroglyphics*—Saml. Birch. *Erman's Life of Ancient Egypt*. Wilkinson—*Ancient Egyptians* . . . 247

"On the festival day"—From the love-songs of a Turin papyrus: *Erman's Life of Anct. Egypt* . . . 250

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"The king appoints" — Trans. from <i>Glock's Symbolik der Bienen</i>	251
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"Go to the bee, and learn how diligent she is, and what a noble work she produces, whose labors kings and private men use for their health; she is desired and honored by all, and though weak in strength, yet since she values wisdom she prevails." — Smith's Dictionary of the Bible."

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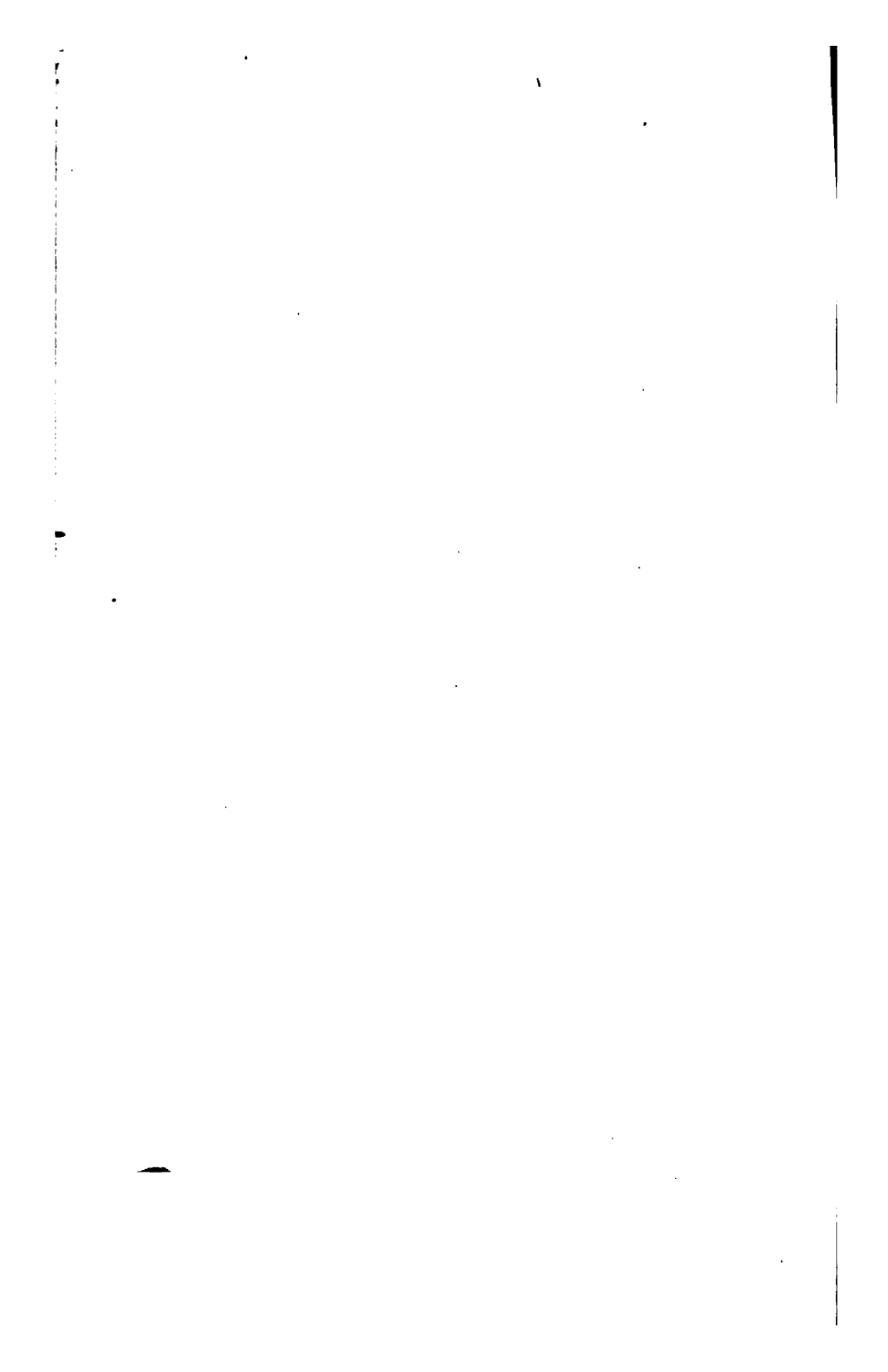
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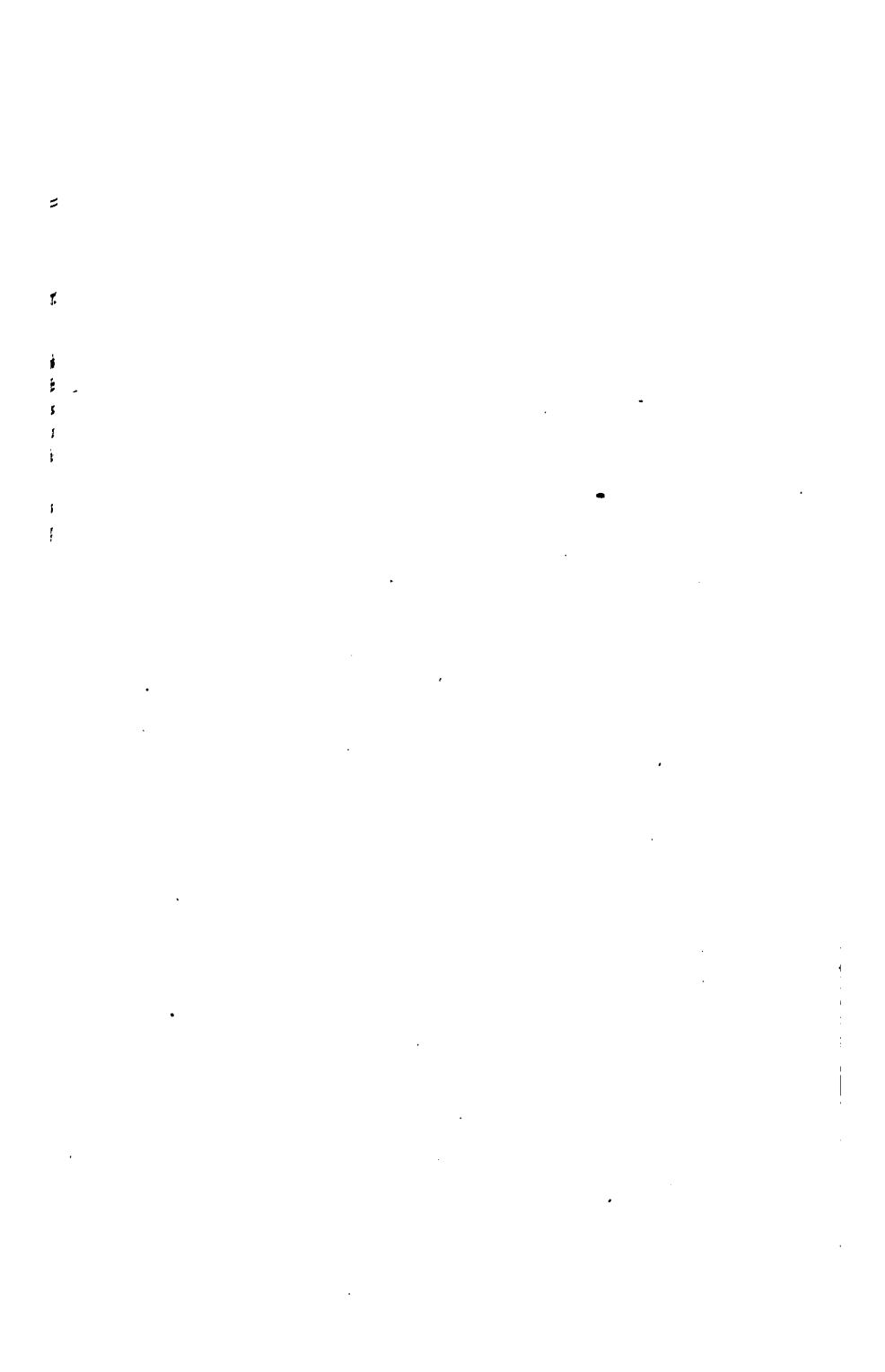
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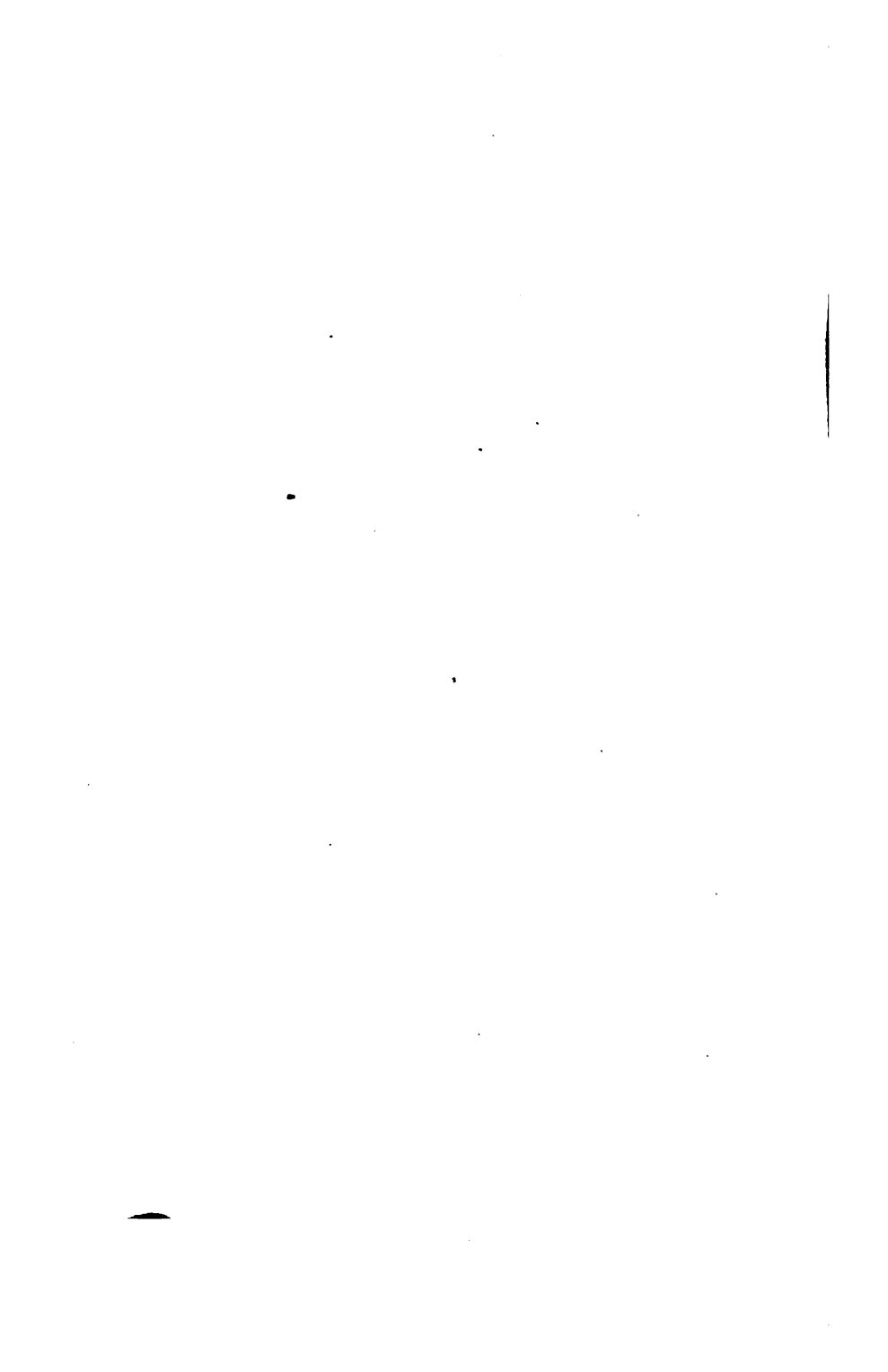
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